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UDC 54.185:541.45

Study of Gd_2O_3 - HfO_2 - Fe_2O_3 System by Mossbauer Spectroscopy

18410173a Kiev UKRAINSKIY KHIMICHESKIY
ZHURNAL in Russian Vol 55 No 3, Mar 89
(manuscript received 13 Jan 88) pp 229-231

[Article by G. A. Teterin, Ye. M. Menchuk, F. K. Yegorov, Ye. G. Semin, and T. M. Shkolnikova, Physicochemical Institute, Ukrainian SSR Academy of Sciences, Odessa]

[Abstract] Results are presented of the application of Mossbauer spectroscopy to an analysis of the system Gd_2O_3 - HfO_2 - Fe_2O_3 in which α - $^{57}Fe_2O_3$ (2 percent by weight) served as the Mossbauer label. Analysis of the spectra over the 900-1,300°C range revealed a relatively constant doublet and spreading of extreme sextuplet lines. The data indicated the formation of solid solutions of the Gd_2O_3 - HfO_2 type and Gd_2O_3 (1:1) compound and stable surface iron-containing phases in the superparamagnetic state. The reaction of Gd_2O_3 with HfO_2 predominated over the reaction of either of these two compounds with the iron oxide. Figures 2; references 4 (Russian).

UDC 541.49:546.73

Determination of Water in Organic Solvents From Extent of $TiCl_4$ Hydration

18410173e Kiev UKRAINSKIY KHIMICHESKIY
ZHURNAL in Russian Vol 55 No 3, Mar 89
(manuscript received 9 Feb 88) pp 261-265

[Article by A. T. Pilipenko, O. M. Drapaylo, and Ye. R. Falendysh, Institute of Colloid Chemistry and Water Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] An analysis was conducted of the effects of trace quantities of water on the optical features of $TiCl_4$ in DMFA, DMSO, methylethyl ketone, acetone, and cyclohexanone. This led to the development of a sensitive spectrophotometric method for quantifying trace water levels in such solvents. The method, based on equilibrium shift analysis in the solvation of $TiCl_4$ with optical densities determined at 345 nm, showed that the minimum detectable concentrations of water in acetone, methylethyl ketone, cyclohexanone, DMSO, and DMFA were, respectively, 8×10^{-4} , 9×10^{-4} , 2×10^{-3} , 7×10^{-3} , and 8×10^{-2} percent by vol. Figures 2; tables 2; references 10: 9 Russian, 1 Western.

UDC 628.3

Quick Spectrophotometric Determination of Free Active Chlorine in Aqueous Solutions

18410180e Kiev KHIMIYA I TEKHOLOGIYA VODY
in Russian Vol 11 No 3, Mar 89 (manuscript received
9 Jun 88) pp 239-241

[Article by I. G. Krasnoborodko, V. V. Kuznetsov, Ye. M. Monosov, A. V. Izotova, Leningrad Institute of Construction Engineering]

[Abstract] Results are presented from studies of the development of quick spectrophotometric analysis of free active chlorine in aqueous solutions. The method is based on determination of active chlorine from the concentration of hypochlorite ions in a strongly alkaline medium with pH over 10. The initial solutions of free active chlorine were produced by electrolysis of aqueous solutions of NaCl, with the pH corrected by the addition of either HCl or NaOH. Spectral characteristics were then taken with an SF-26 spectrophotometer. The range of measured concentrations of active chlorine is determined by the region of the optical density in which the instrument operates reliably. The authors found that the range of measurements of concentrations of active chlorine in standard cuvettes with a solution layer 10 mm thick is 9-168 mg/l. Denser solutions require dilution. Cuvettes with analyzed solutions of greater thickness can be used to increase the sensitivity of the method. The method is recommended for use in pure solutions of active chlorine not containing organic impurities. Figures 2; references 5: Russian

UDC 543.669

Extraction-Atomic Absorption and Extraction-Photometric Methods for Determination of Iron in Copper-Nickel Alloys

18410182a Ivanovo IZVESTIYA VYSSHIKH
UCHEBNYKH ZAVEDENIY: KHIMIYA I
KHIMICHESKAYA TEKHOLOGIYA in Russian
Vol 32 No 1, Jan 89 (manuscript received
29 Jul 87) pp 46-50

[Article by V. V. Skhan, V. B. Ishchenko, V. I. Simonenko, and Ya. S. Pilipyuk, Department of Analytical Chemistry, Kiev State University imeni T. G. Shevchenko]

[Abstract] The goal of this work was to develop a rapid analytical method for small amounts of iron (about 0.002 percent) in copper and copper-nickel alloys after the preliminary extraction of iron. Two approaches were found to be practical: 1) extraction of iron (III) enanthate from an aminoacetic acid solution at pH 6-7 and 2) extraction of iron (III), copper, and nickel at pH 4-7.6 followed by reextraction of copper and nickel with nitritetriaetic acid at pH 6-7. A final determination of the iron could be made either by a photometric method or by atomic absorption determination. The characteristic concentration was $C_x = 0.13 \mu\text{g/ml}$. Figures 3; references 9: 7 Russian, 2 Western.

UDC 543.42.062:546.24 + 546.22

Determination of Tellurium (IV) With Unithiol

18410182b Ivanovo IZVESTIYA VYSSHIKH
UCHEBNYKH ZAVEDENIY: KHIMIYA I
KHIMICHESKAYA TEKHOLOGIYA in Russian
Vol 32 No 1, Jan 89 (manuscript received
10 Nov 87) pp 51-53

[Article by A. S. Babenko, T. D. Kostypkina, and N. N. Zaytseva, Department of Analytical Chemistry, Kharkov Polytechnic Institute imeni V. I. Lenin]

[Abstract] The goal of this study was to develop a rapid analytical method for tellurium in the presence of a large excess of copper (a situation that is characteristic of some industrial effluents). Unithiol (sodium 2,3-dimercaptopropane sulfonate) appeared to be the reagent of choice for this determination. A 30-fold excess of unithiol is mixed with the analytical sample, and the color developed is read at 245-250 nm. This tellurium determination can be performed even in the presence of a 350-fold excess of Co^{2+} , a 50-fold excess of Cu^{2+} and Sn^{2+} and Sn^{2+} , a 2-fold excess of Ni^{2+} , and a 1,000-fold excess of Al^{3+} . Only Fe^{3+} , Pb^{2+} , and Bi^{3+} interfere with this determination. Figures 2; references: 3 (Russian, 1 by Western authors).

UDC 541.16

Ferromagnetic Properties of MnFeCoNi After Plastic Flow at High Pressure

18410185A Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 305 No 2, Mar 89 (Manuscript received 7 Jul 88), pp 369-71

[Article by V. A. Zhorin and N. S. Yenikolopyan, academician, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] A study is made of changes in the magnetic properties of traditional ferromagnetics and the amorphous magnetic $\text{Fe}_5\text{Co}_{57}\text{Ni}_{20}\text{Si}_5\text{B}_{17}$ after plastic flow under a pressure of 2 GPa in an anvil-type high-pressure apparatus. The specimens were pressure treated at room temperature, yielding monolithic, brittle disks that were ground to 10-100 μm in particle size before the magnetic properties were studied on a vibration magnetometer at room temperature in fields of up to 10 kE. The magnetic moment at saturation was increased by 10-15 percent following pressure treatment in the nickel and iron specimens. A minimum is seen on the curve of magnetic moment after compression as a function of compression for all specimens. The residual magnetic moment also increases slightly after treatment. Changes were even more evident in the amorphous specimen tested than in the very fine crystalline specimens of traditional materials. Figures 3; References 8: Russian.

UDC 541.24.088.8

Physicochemical Analysis of $\text{C}_3\text{H}_6\text{O}$ Isomerization Catalysts

18410185B Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 305 No 2, Mar 89 (Manuscript received 7 Jun 88), pp 371-375

[Article by V. V. Kafarov, Academician, I. N. Dorokhov, V. N. Vetokhin, and L. P. Volkov, Moscow Institute of Chemical Technology imeni D. I. Mendeleev; Kuybyshev Polytechnical Institute imeni V. V. Kuybyshev]

[Abstract] A study examined the properties and mutual transformations of substances with the composition $\text{C}_3\text{H}_6\text{O}$ and catalysts of these transformations. The study

confirmed the multiple functionally interconnected changes in ordered sets of the basic and derivative properties of complex chemical compounds. The interconnected regular changes in ordered sets of the basic and derivative properties of substances of this composition result from contact interactions with the catalysts. A list of suitable catalysts is presented. References 8: Russian.

UDC 542

Experimental and Theoretical Study of Possibility of Dimerization of Oxygen Atoms in High-Temperature Ceramic Superconductors

18410185D Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 305 No 2, Mar 89 (Manuscript received 20 Jul 88), pp 399-401

[Article by Yu. M. Shulga, G. L. Gutsev, V. I. Rubtsov, A. I. Boldyrev, Yu. G. Borodko, V. N. Topnikov, and A. A. Ovchinnikov, Corresponding Member, USSR Academy of Sciences, Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka]

[Abstract] The purpose of this work was to produce x-ray photoelectronic O1s spectra for specimens of $\text{La}_{1.8}\text{Sr}_{0.2}\text{CuO}_{4-x}$ (I) and $\text{Y}_1\text{Ba}_2\text{Cu}_3\text{O}_{7-y}$ (II) with a high degree of freedom from impurity contaminants and subsequent mathematical processing of the spectra (which are obtained by subtracting the background of inelastic scattering of electrons and correcting for the resolution of the spectrometer). A second purpose of the study was to develop a theoretical model of the chemical shift of the O1s peak of the peroxide group within the framework of cluster computations by the local density functional method. The studies confirm the possibility of the formation of peroxide groups in two-dimensional lattices of layered high-temperature ceramic superconductor structures. Figures 2; References 13: 2 Russian, 11 Western.

UDC 546.48+547.963.4

Interaction of Cadmium Ion With Human Oxyhemoglobin

18410191I Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 59 No 3 (Manuscript received 24 Jul 87) pp 596-602

[Article by V. S. Konyayeva and A. Ye. Myshkin, Institute of Chemical Physics imeni N. N. Semenov, USSR Academy of Sciences, Moscow]

[Abstract] A study is made of the influence of the cadmium ion on the kinetics of the oxidation of HbO_2 by ferricyanide, as well as the coagulation of HbO_2 initiated by phenylmercuroacetate. The influence of cadmium is compared with that of p-chloromercurobenzoic acid and with previously obtained data on the influence of the LiD ion. The cadmium ion significantly accelerates oxidation of the heme iron by ferricyanide, more than either of the other substances with which it is compared.

Cadmium acetate has little coagulating effect for human oxyhemoglobin in a neutral tris buffer. The HbO_2 coagulate formed in the presence of phenylmercurioacetate is dissolved after the addition of cadmium acetate at a rate proportional to the quantity of salt added. Figures 6; References 9: 7 Russian, 2 Western.

UDC [661.7:547.466.3-318]:[661.7:547.593.211].002.612

Specifics of Cyclohexanol Fractional Composition in Various Caprolactam Production Systems

18410193c Moscow *KHIMICHESKAYA PROMYSHLENNOST* in Russian
No 3, Mar 89 pp 168-70

[Article by V. Z. Fridman, Ye. D. Mikhalechenko]

[Abstract] Results are presented from a study of cyclohexanol fractions obtained in low- and high-temperature caprolactam synthesis. The properties of the fractions were studied by a chromatographic-mass-spectrometric method. A 20-m capillary column with SE-30 applied phase was used to separate the compounds that constituted the cyclohexanol fractions. Heating of the column was increased at a rate of $6^\circ/\text{min}$, to a temperature of 300°C . Acidic impurities are solidly sorbed on the chromatographic phase, which led to the methylation of the acids in the cyclohexanol by diasomethane. It was found that the low-temperature fraction contained acid impurities, particularly adipic acid, whereas the high-temperature synthesis fraction did not. Figures 1; references 8: 7 Russian, 1 Western.

UDC 541.118.127+546.78.261

Influence of Hydrogen on Kinetics of High-Temperature Reaction of Tungsten With Methane

18410208C Moscow *KHIMICHESKAYA FIZIKA* in Russian Vol 8 No 4 Apr 89 (Manuscript received 21 Sep 87) pp 521-524

[Article by S. L. Kharatyan, A. A. Chatilyan, and A. G. Merzhanov, Institute of Chemical Physics, Armenian Academy of Sciences, Yerevan]

[Abstract] A study is made of the influence of hydrogen on the kinetics of the heterogeneous decomposition of methane on the surface of the tungsten carbide phases W_2C and WC , as well as the kinetics of carbidization in the range of methane pressures from 2 to 20 mm Hg, which is reported to be the optimal pressure range for carbidization of tungsten by methane. The experiments were performed by an electrothermographic method at $1,750$ and $2,200^\circ\text{C}$ under static conditions. It is found that the addition of hydrogen to the methane significantly increases the rate of heterogeneous methane decomposition, particularly at higher filament temperatures and lower methane pressures. As the partial pressure of hydrogen increases to 25 mm Hg, the methane pyrolysis rate increases, approaching saturation. Hydrogen also influences the duration of the first stage

and phase composition of reaction products. The addition of hydrogen increases the rate of decomposition and results in the formation of a two-layer diffusion zone of the carbides. The methane decomposition rate increases with hydrogen on the surfaces of both carbide phases. Without hydrogen, the decomposition rate on the surface of the WC phase is low and independent of pressure. Figures 2; References 7: 6 Russian, 1 Western.

UDC 631.81.033:546.799.5:546.799.4

Behavior in Soil and Entry into Plants of Americium-241 Accumulated from Plutonium Applied to Soil

18410210A Moscow *AGROKHIMIYA* in Russian
No 1 Jan 89 (Manuscript received 4 Dec 87) pp 105-08

[Article by Ye. A. Fedorov, Deceased, A. S. Bakurov, V. D. Polyakov, M. N. Fedorova Radium Institute imeni V. G. Khlopin, Leningrad]

[Abstract] The behavior of ^{401}Am accumulated as a result of decay of ^{241}Pu was studied in a large-scale field experiment, and the parameters of its entry into wheat and potato plants grown under normal agricultural conditions was determined. Studies were performed over an area of $1.2 \cdot 10^4 \text{ m}^2$ contaminated with isotopes of plutonium (plutonium-239, 240, 241 and 242). An analogy was found in the behavior of the Pu and Am , both of which are firmly bonded to the soil and migrate little (migration coefficients for both substances about $5 \cdot 10^{-8} \text{ cm}^2/\text{s}$). Eighty-one % of the Am and 84 % of the Pu is bonded with the $5\text{-}100 \mu\text{m}$ fraction. The greatest specific activity is that of the finely dispersed fractions which represent the greatest inhalation danger. Accumulation of Am in plants is an order of magnitude greater than that of plutonium, indicating its greater mobility. Direct γ -spectrometric measurements of ^{241}Am in soil and plant specimens can be used for ecologic investigations. Fig 1; References 8: 7 Russian, 1 Western.

UDC 631.811.94:631.95

Antifeeding and Toxic Properties of Heavy Metal Salts for Insects

18410210B Moscow *AGROKHIMIYA* in Russian
No 1 Jan 89 (Manuscript received 6 Jan 88) pp 109-14

[Article by R. O. Butovskiy, S. A. Roslavtseva, All-Union Scientific Research Institute of Protection of Nature and Preserve Management, State Committee of Agronomy, USSR, Moscow]

[Abstract] The method of determining the contact-intestinal and antifeeding effect of insecticides developed at the All-Union Scientific Research Institute of Chemical Means of Plant Protection was used to estimate the influence of heavy metal salts on insects. Leaf disks were treated in alcohol solutions of salts of mercury, cadmium, lead, copper, zinc, and chromium. Mercury, cadmium and lead were found to have toxicity and antifeeding properties, while copper, zinc and chromium

onl had antifeeding properties. Inorganic salts of copper, chromium and zin had strong antifeeding properties for termites, and are suggested as woo treatments. It is suggested that heavy-metal pollution from highway traffic may influence the distribution of insects in adjacent agricultural fields. References 35: 8 Russian, 27 Western.

UDC 547.239.1

Synthesis and Properties of 1-(O-Alkyldithiocarbonato)alkylisocyanates

18410212A Leningrad ZHURNAL ORGANICHESKOY KHMII in Russian Vol 25 No 4 Apr 89 (Manuscript received 17 Nov 87) pp 759-64

[Article by M. V. Vovk, M. M. Bretsko, and V. I. Dorokhov, Institute of Organic Chemistry, Ukrainian Academy of Sciences, Kiev]

[Abstract] In this work, 1-chloroalkylisocyanates were used to produce monosubstituted alkylisocyanates containing an O-alkyldithiocarboxylic (xanthogenic) acid group. It was shown that upon the reaction of 1-chloroalkylisocyanates having dual reactivity with potassium salts of O-alkylxanthogenic acid, two types of products may be formed—1-(O-alkyldithiocarnato)alkylisocyanates or their isomers N-[(O-alkyldithiocarbonato)carbonyl]alkylidine amines. The experimental conditions of selective reactions leading either to isocyanates or to azomethines were found. References 8: 6 Russian, 2 Western.

UDC 547.322+541.64+542.92+542.976

Reaction of Triphenylstannylisocyanate With 1-Chloro-5,5-dimethyl-2-hexene

18410212B Leningrad ZHURNAL ORGANICHESKOY KHMII in Russian Vol 25 No 4 Apr 89 (Manuscript received 18 Feb 87) pp 764-67

[Article by V. N. Sedelnikova, L. M. Terman, M. I. Sykhranova, and S. Ya. Khorshev, Institute of Chemistry, USSR Academy of Sciences, Gorkiy]

[Abstract] A study is made of the reaction of isocyanate with 1-chloro-5,5-dimethyl-2-hexene without a solvent in a vacuum at 100 to 180 °C, with a chloroalkene:isocyanate ratio of 10:1 and 5:1. It was found that at 100-120 °C no reaction occurs; only at 180°C are substitution products found. The reaction is about 40 percent completed in 3 hours. IR spectroscopy indicates that substitution is accompanied by simultaneous isomerization. A suggested reaction equation is presented. References 13: 11 Russian, 2 Western.

UDC 546.593(661.321+547.288.15)

Chlorocomplex Compound of Gold (III) With Hexamethylene Tetramine

18410213H Moscow ZHURNAL NEORGANICHESKOY KHMII in Russian Vol 34 No 4 Apr 89 (Manuscript received 18 Apr) pp 1055-1057

[Article by T. M. Buslayeva, V. I. Yefanov, and N. M. Sinitsyn, Moscow Institute of Precision Chemical Technology imeni M. V. Lomonosov]

[Abstract] It is found that an individual compound of gold (III) with hexamethylene tetramine (HmTa) is formed in the interval of hydrochloric acid concentration of 0.4 to 4 mol/l. At less than 0.1 mol/l, a brick-red sediment precipitates that was not identified, whereas at over 4 mol/l the yield of the compound is significantly reduced. The most important factor influencing the synthesis is therefore the acid concentration in the initial aqueous solution. The composition of the compound synthesized is $C_6H_{12}N_4HAuCl_4$. It is soluble in acetone and alcohol and acts as a two-ion electrolyte in DMFA. The HMTA molecule is proved by IR spectroscopy to be monodentate. The data indicate that the authors have synthesized a complex compound of gold (III) with HMTA in which the HMTA acts as an organic nonspherical cation forming an intramolecular bond with the tetrachloroaurate ion. Figures 2; References 8: 3 Russian, 5 Western.

UDC 546.65.87

Tisonite-Like Phases Containing Bi and Rare Earth Elements

18410213I Moscow ZHURNAL NEORGANICHESKOY KHMII in Russian Vol 34 No 4 Apr 89 (Manuscript received 18 Apr 88) pp 1058-1060

[Article by Ye. I. Ardashnikova, and M. P. Borzenkova, Moscow State University imeni M. V. Lomonosov]

[Abstract] The purpose of this work was to produce phases containing two cations (Bi, rare earth element) and various anions (S, F, and possibly, O). Sulfide-fluoride phases were obtained that contained Bi and Dy, i.e., stibnite-like solid solutions with small quantities of fluorine. In this work, the oxosulfide $BiLnOS_2$ ($Ln = La, Pr$) was reacted with gaseous hydrogen fluoride. Solid-phase synthesis was performed in quartz ampules evacuated to 10^{-3} torr. Synthesis was performed for 40 hours at 700°C, followed by 120 hours at 500°C. Tisonite-like fluorine-containing phases were synthesized in which a small quantity of oxygen and sulfur was retained. References 13: 9 Russian, 4 Western.

UDC 546.881+548.32

Solid Solutions With Palmierite Structure in System $\text{SrO}-\text{La}_2\text{O}_3-\text{V}_2\text{O}_5-\text{GeO}_2$

18410213J Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 34 No 4, Apr 89 (Manuscript received 15 Jun 88) pp 1082-1083

[Article by V. D. Zhuravlev, Yu. A. Velikodnyy, and M. Ya. Khodos, Institute of Chemistry, Urals Division, USSR Academy of Sciences; "IREA" Scientific Production Association]

[Abstract] It can be assumed that filling all the cation vacancies in $\text{Sr}_2\text{La}_{0.67}\text{V}_2\text{O}_8$ while retaining the crystal-line structure can be achieved by the conjugate heterovalent substitution $\text{M}^{2+} + \text{A}^{5+} = \text{M}^{3+} + \text{A}^{4+}$. This article presents an experimental verification of this hypothesis using the pairs $\text{Sr}^{2+}-\text{V}^{5+}$ and $\text{La}^{3+}-\text{Ge}^{4+}$. Solid-phase synthesis at 550-1,300°C using oxides of vanadium (V), germanium (IV), lanthanum (III), and strontium carbonate produced specimens of two systems: $\text{Sr}_3\text{V}_2\text{O}_8-\text{Sr}_2\text{LaVGeO}_8$ and $\text{Sr}_2\text{LaVGeO}_8-\text{Sr}_2\text{La}_{0.67}\text{V}_2\text{O}_8$, both of which are found to be continuous series of solid solutions with a palmerite structure, differing in the absence of cation defects in the former and the presence of these defects in the latter system. References 4: 2 Russian, 2 Western.

UDC 537.533

Electrophysical Phenomena Observed During Breakdown of Molecular Organic Crystals

18410214c Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 63 No 4, Apr 89 (manuscript received 26 Apr 88) pp 1084-1086

[Article by Ye. A. Varentsov, Yu. A. Khrustalev, and V. M. Khrapal, Moscow Engineering Physical Institute]

[Abstract] The goal of this study was to investigate the mechanical emission of electrons and electromagnetic radiation during the breakdown of molecular organic crystals. It was shown that in a vacuum a series of electrophysical phenomena take place: electron emission along with electromagnetic radiation in the optic, the radio, and possibly the x-ray ranges of the spectrum. The electron flow up to $5 \cdot 10^4$ eV depended on the nature of the substance and on the crystallographic orientation of the sample. In case of molecular crystal breakdown no chemical bonds were broken, although electron emission occurred quite reproducibly. The presence of highly energetic electrons supports the idea that high-density charges appear on the freshly cleaved surfaces and accelerate electrons to such high energy levels. Crystal cleavage in total darkness resulted in uneven lighting of the photofilm, a result of photon illumination from separate areas of the freshly cleaved sites. It is also possible that this photofilm illumination results from x-ray irradiation that occurs during the slowdown of

emitted electrons on the walls of the forming fissure. Figures 2; references 17: 14 Russian, 3 Western (1 by Russian authors).

UDC 542.61:547.28

Synthesis of Guanidinium Salts and Possibility of Their Use as Anion Exchangers

18410215A Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 44 No 4, Apr 89 (Manuscript received 30 Dec 87) pp 620-23

[Article by N. A. Ampilogova, V. S. Karavan, M. A. Moskalenko, and V. A. Nikiforov, Leningrad State University]

[Abstract] Hydrophobic guanidinium salts are synthesized, and the possibility is studied of using them as anion exchangers in the ion-exchange extraction of oxygen-containing anions. The chloride salts of quaternary-substituted guanidines were synthesized. It was found that the chloride of N,N'-dicyclohexyl-N''-cetylguanidinium can be recommended as an anion exchanger. It is more effective than tetradecylammonium chloride is for anion-exchange extraction of sodium acetate, sulfate, phosphate, and carbonate. References 15: 4 Russian, 12 Western.

UDC 543.42

Method of Determining Characteristics of Submicron Aerosols Formed in Pneumatic Nebulizers for Atomic Spectroscopy

18410215B Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 44 No 4, Apr 89 (Manuscript received 30 Dec 87) pp 634-40

[Article by A. A. Kirsh, A. V. Zagnitko, I. B. Stechkina, and E. G. Chudinov]

[Abstract] The purpose of this work was to determine the concentration and mean dimensions of droplets obtained in pneumatic nebulizers for atomic-absorption spectrometry by a recently developed integral electrical method involving measurement of the ratio of transfer currents of droplets charged with unipolar ions in the presence of strong and weak external electric fields. The values of average particle radius determined by the new method were found to be two to five times smaller than in previous works studying the same nebulizers, indicating that the methods previously used were not sufficiently sensitive. Figures 2; References 36: 8 Russian, 8 Western.

UDC 543.422

Electrothermic Atomic-Absorption Analysis of High-Temperature Superconducting Materials*18410215C Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian**Vol 44 No 4, Apr 89 (Manuscript received 21 Jun 88) pp 646-649*

[Article by M. K. Belskiy, L. I. Ochertyanova, I. S. Shaplygin, E. A. Tishchenko, and V. B. Lazarev, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences, Moscow]

[Abstract] The purpose of this work was to find a method to increase the service life of a graphite tube lined with tantalum foil and to optimize the conditions of electrothermic atomic absorption analysis of high-temperature superconducting materials containing carbide-forming elements. Optimal conditions for the electrothermic atomic-absorption determination of the major components of high-temperature superconducting microcrystals, films, and powders containing Y, Ba, Sr, rare-earth elements, and Cu are selected. It is shown that replacing the lining cylinder with a narrow ring of tantalum foil increases the service life of the nebulizer by a factor of 4-5 and improves the reproducibility of the results by a factor of 2-3. The sensitivity of the determination is slightly decreased. References 12: 4 Russian, 8 Western.

UDC 543.42

Atomic Ionization Determination of Ytterbium in Highly Pure Thulium and Lutecium*18410215F Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 44 No 4, Apr 89 (Manuscript received 19 Feb 88) pp 666-670*

[Article by A. G. Marunkov, N. V. Chekalin, S. V. Bachin, and N. S. Stroganova, Institute of Geochemistry and Analytic Chemistry imeni V. I. Vernadskiy, USSR Academy of Sciences, Moscow]

[Abstract] Methods are developed for the analysis of lutecium and thulium for their ytterbium content by an atomic ionization method with the specimen atomized in flames. It is found that the base used has no influence on the analytic signal generated by the ytterbium, while the limit of detection is determined by fluctuations in additive noise from lutecium and thulium monoxides. The limits of detection of ytterbium were found to be $1 \cdot 10^{-3}$ percent in thulium and $2 \cdot 10^{-4}$ percent in lutecium. Figures 4; References 9: 7 Russian, 2 Western.

UDC 543.422:54.412.2:541.49:546.9

Determination of Palladium, Platinum, and Rhodium by High-Performance Liquid Chromatography After Extraction Preconcentration*18410215G Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 44 No 4, Apr 89 (Manuscript received 29 Jan 88) pp 680-688*

[Article by Ye. M. Basova, T. A. Bolshova, V. M. Ivanov, and M. B. Morozova, Moscow State University imeni M. V. Lomonosov]

[Abstract] A new combined method has been developed for the determination of certain platinum metals; it combines solvent-extraction preconcentration as chelates in 1-(2-pyridylazo)-2-naphthol(PAN) and determination by normal-phase high-performance liquid chromatography against a background of predominant quantities of copper, nickel, and cobalt. The limits of detection (in ng/ μ l) are Pd, 0.1; Pt, 0.7; and Rh, 0.5. The methods can be used to determine Pd in the presence of 80-100 times excesses of Cu and Co and to determine Pd, Pt, and Rh in regeneration copper. Figures 3; References 16: 11 Russian, 5 Western.

UDC 543.544:541.135.52

Highly Sensitive Amperometric Microdetector for Capillary Liquid Chromatography*18410215H Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 44 No 4, Apr 89 (Manuscript received 28 Jan 88) pp 725-727*

[Article by V. F. Ruban and B. G. Belenkiy, Institute of High-Molecular Mass Compounds USSR Academy of Sciences, Leningrad]

[Abstract] A detector has been designed with a measurement cell having a small effective volume, which allows the detector to be combined with a chromatographic system based on columns of flexible quartz capillaries packed with a fine-grain sorbent. The detector can record electrochemically active substances on solid microelectrodes in the oxidation or reduction mode with quantitative results. The limits of detection of phenol compounds amount to 0.5-2.1 pg. Figure 1; References 14: 3 Russian, 11 Western.

UDC 543.544.45:632.934:678.043.52

Determination of Residual Quantities of Organotin Pesticides in Agricultural Products by Gas-Liquid Chromatography*18410215I Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 44 No 4, Apr 89 (Manuscript received 22 Oct 87) pp 745-748*

[Article by A. F. Shushunova, V. V. Kutsovskaya, M. V. Skovorodina, and G. I. Makin, Scientific Research Institute of Chemistry, Gorkiy State University imeni N. I. Lobachevskiy]

[Abstract] A gas-chromatographic method has been developed for the highly sensitive determination of organotin pesticides in agricultural products by their conversion to a more volatile compound—tributyltin hydride. Gas-liquid chromatography is used to determine the residual quantities of organotin pesticides in agricultural products with a relative standard deviation of not over 0.07. Figures 2; References 8: 4 Russian, 4 Western.

UDC 541.128.13:541.183.26

Adsorption Characteristics and Activities of Supported Iron Catalysts

18410173b Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 55 No 3, Mar 89 (manuscript received 28 Dec 87) pp 238-240

[Article by V. K. Yatsimirskiy, Ye. V. Ishchenko, N. V. Kirillova, D. V. Gorda, and Zo Zen Kho, Kiev University]

[Abstract] An analysis was conducted of the efficiency of iron on alumina and C fiber supports as a catalysis for NH_3 synthesis in relation to the adsorbed form of nitrogen. The mass spectrometric data of the thermal desorption process over 600 to 900 K showed that on the Fe/C system nitrogen existed in the β_1 -form, with an activation energy for desorption of 248 kJ/mol. The efficiency of ammonia synthesis on the Fe/C system was twice as high as on the Fe/ Al_2O_3 system, on which nitrogen was adsorbed in the β_1 and β_2 forms. The greater efficiency of the Fe/C catalyst was evidently attributable to the β_1 -form of adsorbed nitrogen. Figures 2; tables 1; references 4: 3 Russian, 1 Western.

UDC 621.391:541.183

Investigation of Adsorption Models on Catalyst Surface by Means of Pulse Methodology

18410182c Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHOLOGIYA in Russian Vol 32 No 1, Jan 89 (manuscript received 12 Jan 89) pp 58-61

[Article by I. I. Novikova, A. Sh. Ziyatdinov, and V. N. Pisarenko, Department of Cybernetics of Chemical Technology Processes, Moscow Chemical Technology Institute imeni D. I. Mendeleev]

[Abstract] The mechanism of the adsorption of unsaturated hydrocarbons (isoprene, divinyl) on a nickel catalyst based on diatomaceous earth was investigated. Three models of monomolecular adsorption were used to describe the adsorption isotherms: the Williams-Henry, Magnus, and Kiselev models. The Williams-Henry equation is based on the assumption that the forces interacting between the surface of the catalyst and the adsorbate are chemical in nature. Magnus assumes an electrostatic interaction, and Kiselev considers the interaction between individual adsorbed molecules. An analysis of the experimental and theoretical data obtained indicated that the Kiselev model was best in relating the theoretical data to experimental data, followed by the Williams-Henry and Magnus models. References 5: 4 Russian (1 by Western author), 1 Western.

UDC [661.7::547.295.73+661.7::547.295.8+661.7::547.295.91].002.612.3

Selective Hydrocarboxylation of C_{12} - C_{14} Olefins with Catalysis by Palladium Complexes

18410193b Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 89 pp 165-66

[Article by M. I. Terekhova, L. F. Staroselskaya, V. V. Yurov, A. A. Potatuyev, E. S. Petrov]

[Abstract] Laboratory studies of selective hydrocarboxylation of C_{12} - C_{14} olefins demonstrated that a catalytic system that includes a complex of $\text{PdCl}_2(\text{PPh}_3)_2$ with the addition of PPh_3 and SnCl_2 can yield over 90% C_{13} - C_{15} fatty acids by hydrocarboxylation of C_2 - C_{14} olefins under comparatively mild conditions. The reaction was conducted in dioxane at 100° C, molar water:olefin ratio 2.7:1, palladium complex concentration $3.9 \cdot 10^{-3}$ mol/l. Separation of transition metal complexes, which are returned to the reaction zone in catalytically active form, is an important technological stage in the homogeneous catalytic process. The method used was precipitation with hexane and subsequent filtration, returning 99.6% of the palladium complex, for a loss of 7.7 g of palladium per ton of end product, with an 85% yield. References 4 (Russian).

UDC 547.518.46

Synthesis of 1-Ethynylcyclododecanol and Its Isomerization on Vanadium Catalyst

18410212C Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 25 No 4 Apr 89 (Manuscript received 31 Oct 87) pp 779-82

[Article by L. I. Zakharkin, A. P. Pryanishnikov, and S. T. Ovseyenko, Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow]

[Abstract] A study is made of the conditions for the synthesis of 1-ethynylcyclododecanol from acetylene and cyclododecanone and its isomerization to cyclododecenyl ethanal and cyclododecylidene ethanal on vanadium catalysts previously used for the isomerization of tertiary acetylene alcohols to α , β -unsaturated aldehydes. Caustic potash is used in solvating solvents at atmospheric pressure to produce the reaction. It is found that, at atmospheric pressure in such solvents as THF, DMSO, HMPTA and N-methylpyrrolidone, carbinol is obtained with high yield, with small quantities of bis (1-oxy-1-cyclododecyl) acetylene also being formed. Isomerization yields a mixture of aldehydes at 58 and 42 percent. The aldehyde mixture has a fruity odor. The two aldehydes are in equilibrium and are easily converted one to the other. References 5: 1 Russian, 4 Western.

UDC 541.183.6

Adsorption-Structural Properties and Phase Composition of ZnO- Al₂O₃-Metallophosphate Specimens

18410223A Minsk IZVESTIYA AKADEMII NAUK BELORUSSKOY SSR: SERIYA KHIMICHESKIKH NAUK in Russian No 2, Mar-Apr 89 (Manuscript received 9 Oct 87) pp 14-18

[Article by V. S. Komarov, N. I. Velichko, and A. I. Ratko, Institute of General and Inorganic Chemistry, Belorussian Academy of Sciences]

[Abstract] A study is made of the adsorption-structural properties of ZnO:Al₂O₃:P₂O₅-type adsorbents and the phase transformations occurring in them during heat treatment at 400-800°C. It is found that the presence of aluminum and zinc phosphates in the medium of coprecipitated hydroxides has a strong influence on the growth process, the packing of the particles, and the formation of hydrogel-metallophosphate compounds with high-adsorption structural parameters and good thermal stability. Figures 2; References 9: 8 Russian, 1 Western.

UDC 546.98+541.128

Influence of Method of Producing Palladium Oxide-Magnesium Catalysts on Formation of Paramagnetic Palladium Ions

18410223C Minsk IZVESTIYA AKADEMII NAUK BELORUSSKOY SSR: SERIYA KHIMICHESKIKH NAUK in Russian No 2, Mar-Apr 89 (Manuscript received 10 Nov 87) pp 36-39

[Article by L. S. Kravchuk, N. I. Ivashchenko, and M. V. Zaretskiy, Institute of Physical Organic Chemistry, Belorussian Academy of Sciences]

[Abstract] A study is made to determine whether the presence of the Mg(OH)₂ phase in the composition of a mechanical mixture with palladium hydroxide is sufficient for the production of a magnesium oxide system with paramagnetic ions, or whether the preliminary formation of compounds such as Pd and Mg hydroxides is required. It is found that the production of specimens with the greatest concentration of Pd⁺ requires the codeposition of magnesium and palladium hydroxides from solutions of their salts, which ensures the formation of the Pd and Mg hydroxide complex in the stage of synthesis. Figure 1; References 9: 5 Russian, 4 Western.

**CPSU Central Committee Secretary Visits
Chemical Exhibition**

18410132c Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 10 Jan 89 p 2

[Article: "Visit to an Exhibition"]

[Text] Not one sector of today's economy can develop without the wide-scale use of chemical processes and materials. The scale and sphere of the application of chemical products are expanding at a rapid rate. This task is being carried out in our industry within the framework of an integrated program for chemicalization of the national economy. Its implementation will make a major stride forward possible in increasing the country's economic potential. An exhibition entitled "Chemistry and Acceleration of Scientific and Technical Progress" was opened at the Exhibition of the Achievements of the USSR National Economy. Over 20 ministries and departments are taking part in it. More than 2,500 exhibits provide a visual impression of the accomplishments of chemistry and chemical materials and of production processes of the future. A specialized exhibition is running concurrently. This exhibition was visited on 9 January by CPSU Central Committee Secretary O. D. Baklanov.

The exhibits reveal a broad spectrum of future structural polymers, plastic and rubber articles, chemical products for agriculture and the food industry, film production processes, bioengineering processes, and modern computerized automation and monitoring systems. The section "Chemistry in the Service of Man" shows a diverse assortment of consumer goods and drugs.

An exchange of opinions was held on the present trends in the development of chemistry and on the practical steps undertaken after the May 1988 meeting of the CPSU Central Committee to increase the production of chemical goods. The importance of making wide use of new materials, chiefly composite materials, in the production of motor vehicles, aircraft, ships, and other equipment was noted. The CPSU Central Committee secretary turned special attention to examining the possibilities of chemistry for protecting the environment. The discussion focused on introducing modern wasteless production processes guaranteeing ecological safety at enterprises and making an integrated use of natural resources.

The need for uniting the efforts of all interested ministries in providing chemical enterprises with all needed equipment was emphasized during a discussion of the results of the inspection. The equipment shortage is presently one of the principal causes holding back development of this important national economic complex.

O. D. Baklanov was accompanied by USSR Council of Ministers Deputy Chairman V. K. Gusev, CPSU Central Committee department director O. S. Belyakov, USSR ministers, and other party and business executives.

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18410132g Moscow PRAVDA in Russian 11 Jan 89 p 3

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**Soviet Chemical Industry Minister Yu. A.
Bespalov Interviewed**

18410227a Moscow PRAVITELSTVENNYY VESTNIK
in Russian No 7, Apr 89 pp 1, 9

[Interview by PRAVITELSTVENNYY VESTNIK correspondent V. Yurteyev with Yu. A. Bespalov, Soviet Chemical Industry Minister, under the "We Introduce a New Rubric: Two Questions to the Minister" rubric: "Both Genies and Magic Wands"; first paragraph is PRAVITELSTVENNYY VESTNIK introduction]

[Text] The new rubric was suggested by our mail, which contains ever-increasing requests like the following: PRAVITELSTVENNYY VESTNIK should give readers the possibility of entering into a dialogue with the leaders of the various sectors of the economy. Today, after selecting from the mail two of the most characteristic, significant, and timely questions pertaining to problems of chemistry, we asked Yu. A. Bespalov, minister of the USSR Ministry of the Chemical Industry, to respond.

QUESTION: Chemistry and ecology. These terms today are literally placed on opposite sides of a barricade. Can

this conflict be resolved, and what specific steps are being taken in this direction?

ANSWER: It is now important to define a course of development for the chemical industry that would make it possible to avoid an ecological catastrophe while meeting the growing needs of mankind.

According to data from the World Health Organization, only 20 percent of the total amount of pollution is attributable to industry, with the remaining 80 percent being due to automobiles, agriculture, and other factors.

Chemistry is only one of the sources of environmental pollution. It is like a genie released from its bottle. But at the same time, chemistry itself provides us with a magic wand to tame the genie. Only chemistry is capable of helping man prevent an ecological catastrophe. Only the chemical industry is able to create, and is already today, turning out highly effective means of protecting the environment: polymer membranes, synthetic filters, flocculants, and many other things that make it possible to trap harmful impurities and make use of waste products.

But what are chemists themselves doing to eliminate the ecological threat? The following item is of interest. The quantity of harmful emissions from the sector's enterprises currently amounts to only 1 percent of the total sum of industrial emissions in the country. Even so, the policy of the USSR Ministry of the Chemical Industry is clear on this point: all new production plants currently being created must be ecologically innocuous. We are approaching the matter of modifying existing enterprises and improving the qualifications of the labor force in just the same way.

With this goal, the sector created the "Ecology" program and has already begun to implement it, allocating 150 million rubles for this each year. The effectiveness of the work in this area is obvious—the emission of harmful substances into the atmosphere after 3 years of the 12th Five-Year-Plan has diminished by 10 percent, the outlay of fresh water has been cut back by 5 percent, and the amount of harmful effluent has been lowered by 70 percent. A closed circuit of water is already present in 83 percent of the enterprises of the sector. And all of this was accomplished with a simultaneous 119.4 percent increase in the volume of production. Every 6th enterprise of the sector today is complying with the stringent environmental protection standards, while every 10th enterprise is already absolutely ecologically clean.

On the whole, implementation of the "Ecology" program will make the chemical industry fully ecologically safe within 5 or 6 years. An ecological passport has been developed for record keeping and analysis of pollution in the sector. This document, coordinated with the USSR State Committee for Nature, will become a pledge of better safety not only at the enterprises of the chemical industry, but also in the entire chemistry-forestry complex.

The problem lies elsewhere: in order to create ecologically clean operations, not only our sector but in every sector, requires enormous additional funding. Often the funds amount to as much as half the prime cost of the facility. It is not necessary to demonstrate whose interests were sacrificed in the past to expand the production. But I am convinced that the time has come to make our industry one of the most humane sectors, as it is in many other developed countries.

Chemists are actively searching for ways to improve the ecological situation. Clearly, what is needed here are fundamentally new scientific approaches. Unfortunately, our academic and practical science is not yet providing such solutions. I believe that we can spring forward by developing an extensive scientific and technical cooperation with other countries. The experience of Western Europe is of interest, where around 10,000 chemical and petrochemical enterprises producing a full spectrum of chemical products are located in a relatively small territory. The concentration of chemistry there is immense, but even so, it is handling ecological problems more successfully than we are. That is why our nation must increase the investment allocated for ecological problems, making this at least 5 percent of the total prime cost of the products manufactured—which is at the level of that in the leading Western countries. Only joint efforts can solve the ecological problems facing world society.

We feel that the labor force councils and enterprise administrations should devote more attention to the issue of environmental protection in our country. This task, which has been imposed on them by the USSR Law Regarding a State Enterprise (Association), is much more than a good intention. The volleys of harmful substances emitted by the enterprises of our sector and those of the other ministries generally result from flagrant violation of the labor and technological discipline, even outright irresponsibility of the workers and technicians with respect to their basic duties. If not the labor force councils, then who is obligated to make each worker aware that his faultless management of the technological process will largely determine his own health, that of his family, and that of people he doesn't even know?

In matters of environmental protection, the most diverse social movements in defense of this issue should also be conscientious. Their actions should not be detrimental to the nation's economy, that is to say, to themselves. Most commonly, the agitated demonstrations of the "nonformalists" for a "clean ecology" are the outcome of their poor understanding of the actual state of affairs or downright ignorance.

We must form an objective public opinion regarding chemistry and its issues. And the mass media may play an invaluable role here.

Recently, the Central Television channel "Good Evening, Moscow!" broadcast the program "Chemistry

and Us." It turned out that the population of the capital city has the most confused notions as to the mission and role of the chemical industry. And what is all the more offensive, foreign guests in Moscow, who were also interviewed for the program, could not imagine modern life without modern chemistry.

We, for our part, desire an active interaction with the media. In 1987 and 1988 we held 16 press conferences on the most diverse issues of the activities of the sector for Soviet and foreign journalists. The members of the collegium met with journalists and took them around to the enterprises, the organizations, and the scientific research institutes.

Today, special information centers are being created to increase the level of public information in areas of heavy chemical industry operations. Outfitted with automatic monitoring equipment, they quickly identify the culprits responsible for elevated emissions of harmful substances into the environment. Of course, for the moment, there are clearly not enough such centers. We shall continue this work along with the USSR State Committee on Nature [Goskompriroda].

QUESTION: Chemistry and shortages. Shortages of chemical products are felt today not only by the homemaker, who experiences difficulty in obtaining laundry detergent, and not only by the music lover, who has difficulty in obtaining tape cassettes, but also by entire sectors of the economy. They lack polymer films to develop membrane technology, or the new generation of construction plastics, of which we are producing a tenth the amount of other developed countries. No growth in cotton production makes it necessary to develop the production of chemical fibers. Chemicals play a large part in the manufacture of consumer goods, the production of which is steeply on the rise today. What is the policy of the sector's decision makers, given (on the one hand) the more urgent demands regarding the ecological aspect of production, the siting of new plants and the expansion of existing ones, and (on the other) the increasing demand to expand the production of chemical goods?

ANSWER: I already talked about the need for a prioritized development of the chemical industry in connection with the ecological situation. But scientific and technical progress in the machine building industry, light industry, the wood processing industry, and other sectors of the economy today is also inconceivable without modern chemical materials. Without chemistry, no successful solution is possible for the food and housing problem; the assortment of clothing, footwear, household articles, and medication cannot be expanded; and the shortage of automobiles, radiators, furniture, and other goods cannot be alleviated. The fact that the population is continually faced with shortages of consumer goods is largely a function of the level of development of our sector.

Unfortunately, the degree of chemicalization in our country at present is clearly inadequate, being much lower than the level of the major capitalist nations. Moreover, a similar backwardness prevails in other sectors as well.

For our part, we are trying to rectify the present situation. For example, the production of chemical fibers and threads is slated to increase by 23 percent. Within 2 years, their production will rise from 1.55 million tons to 1.63 million, and by 1995 it will reach 2.260 million. This will almost completely cover the demand of light industry. Similar programs have been undertaken to increase the production capacity for construction plastics, dyestuffs, caustic soda, iodine, and bromine products.

Steps are being taken to expand and renovate the household chemical product mix, especially synthetic detergents. The production of general purpose bleaches, softeners, contact glues, and pest control chemicals is being boosted. The assortment of household paint and lacquer materials is continually expanding and increasing in volume, including enamels for exterior use, rust preventive primer and paint, automobile enamels, and wood protection formulas. The demand for these goods, as well as that for synthetic detergent, should be fully satisfied in 5-6 years.

Implementation of the "Color" and "Magnet" comprehensive target programs in the next five year plan will sharply increase the production of color movie film and magnetic tape on a par with the internationally known Kodak brand, achieving full satisfaction of the domestic demand. Incidentally, compact cassettes with magnetic tape of improved quality are already making it to the stores. But let us be frank—there is still not enough of them. And even though the production of compact cassettes will reach 50 million next year, the market will only be completely saturated by 1995.

The continually expanding and deepening scientific and technical cooperation with foreign countries is very important for the saturation of our country with chemical consumer items. An example of this is the creative collaboration between chemists of the USSR and the GDR in the framework of the multinational economic associations Assofoto and Domokhim. The cleaning agents Chistol-ekstra and Sanfor, the air freshener Toyleks, the antistatic Lana-1, and other household chemicals produced in the USSR under the Domokhim brand are well known in every home.

In the past 2 years alone, we have created five joint enterprises for production of chemical products, consumer goods, perfumes, and cosmetics. These include Sovplastital, Mirakulyum, Tavriya, Khromogen, and the engineering/commercial company Asetko. For example, the joint enterprise Sovplastital, organized with the Italian Almo-Rose company, produced 25 million rubles worth of plastic consumer goods in 1988, almost doubling its volume in a year. The products of this company

enjoy much demand not only in our company, but also abroad. In the development stage are new joint enterprises for the production of consumer goods, including such prestigious American companies as Occidental Chemical Corporation, Dupont, and others.

One more fact that must be told to the public. In 1985, the Comprehensive Program for Chemicalization of the USSR Economy up to the Year 2000 was approved. It was believed that this program would lead the nation to full satisfaction of the demand for chemical materials. However, implementation of the program is threatened with failure since the funds made available are far from enough.

The situation is aggravated by the fact that a deliberate imbalance in the development of the basic sectors of industry is increasing. This means that advanced sectors such as the electronic and electrotechnical industry, instrument and radio production, and others are progressing at a faster pace than the basic chemical industry is, i. e., an imbalance is deliberately fostered in the nation's economy.

This in itself is a dangerous feature that may lead to a breach in the chemical industry, with ever deepening crises in the economy, since almost every sector of our country depends on chemical products to operate.

Modernization of the equipment of the chemical industry is also being delayed by the inadequate state of the Soviet chemical machine industry, the shortfall of such products for our sector alone in the current five-year-plan being more than a billion rubles.

As we know, proposals are now being examined to change the role and the functions of the ministries in the economic complex. It would seem to be warranted to combine the USSR Ministry of the Chemical Industry and the USSR Ministry of Fertilizers, as well as part of the USSR Ministry of Chemical Machines, into a single chemical complex. By the way, these sectors themselves once "budded off" from our industry. Such concentration would repair the fragmentation of certain important scientific-technical and economic functions and speed the development of the chemical industry of our country.

Beyond doubt, the time will come when chemistry, as in many other developed countries, will also become the top priority in our economy too.

A BRIEF NOTE ABOUT YU. A. BESPALOV: Born in 1939, he is a Russian and a member of the CPSU since 1967. A graduate of the Kazan Institute of Chemical Technology imeni Kirov and the Academy of Social Sciences of the CPSU Central Committee, he is a doctor of technical sciences and a holder of the USSR State Prize.

He began his career in 1961 as a process engineer, production foreman, and department head at chemical enterprises. From 1972 to 1979 he worked as chief

engineer of the Okhtinsk scientific production association Plastpolimer. Since 1979 he has held positions of responsibility within the CPSU Central Committee: instructor, consultant of the department of chemical industry of the committee, reviewer of the secretary of the committee, and (since 1984) deputy chief of the department of chemical industry. As of 1986 he has been minister of the USSR chemical industry.

UDC 661.715.332:66.041.454.012-52

Improvement of Fuel Combustion Systems in Pyrolysis Furnaces of EP-300 Installations

18410193a Moscow *KHIMICHESKAYA PROMYSHLENNOST* in Russian No 3, Mar 89 pp 163-165

[Article by V. V. Sharikhin, A. S. Pechnikov, V. V. Stepanchuk, M. P. Bezuglov, A. P. Stokov, V. V. Burmistrov]

[Abstract] Studies were made of the operation of EP-300 pyrolysis furnaces for the manufacture of ethylene at several plants at various times of year. Combustion product analyses, backed up by flue gas analyses, were used to examine the efficiency of convection chambers of the at the Gorknefteorgsintez production association. Furnace efficiency was found to fluctuate between 80.4% and 84.6%, owing to variation in fuel consumption coefficient and, to a lesser extent, flue gas temperature. The absence of control of the fuel burning process led to an average fuel gas loss of 2-3%. The F-08A chamber—the only one at the plant equipped with AGG-II acoustic gas burners—exhibited the highest efficiency, which was attributed to a lower fuel consumption coefficient, itself attributed to better mixing by the burners, a better seal, and the absence of infiltration. Another study site was the Salavatnefteorgsintez production association, whose furnaces use an advanced fuel burning system with AGG-II burners. The precise regulation of the fuel/air mixture in the furnaces yielded furnace efficiencies of 86-87%. Winter tests at the same plant, however, showed higher fuel consumption, because of rarefaction in the chambers and no monitoring of the fuel burning process. The installation of automated vacuum control systems cut fuel consumption in the F-02B furnace by 100 kg/hr, or 6.5%. The authors feel that the reliable and stable operation of combustion systems with AGG-II burners and the possibility of burning fuel with a broad fractional composition with a low air flow factor and with complete chemical burning made it possible to regulate furnace heat conditions. Automated maintenance of the air flow factor at levels of 1.05-1.1 enables consistent fuel savings of up to 5-7%. Figures 2.

UDC 66.097.3:[661.7:547.562.1]

Use of Perchloric Acid in Decomposition of Isopropylbenzene Hydroperoxide

18410193d Moscow *KHIMICHESKAYA PROMYSHLENNOST* in Russian No 3, Mar 89 pp 173-174

[Article by B. V. Galabitskiy, T. N. Mikhaylovskaya]

[Abstract] The decomposition of isopropylbenzene hydroperoxide in the presence of Fraude's reagent was studied. When Aerosil activated with perchloric acid was used to catalyze the decomposition reaction, a number of anomalous kinetic phenomena were observed. The reaction clearly had two stages, the first occurring at a rapid rate and then slowing, and the second featuring an almost instantaneous increase in reaction rate accompanied by a substantial exothermic effect. Increasing the catalyst concentration to 4 g/l stepped up the reaction quickly. The perchloric acid-activated Aerosil resulted in 100% conversion and great selectivity. Catalyst life was found to be longer in a batch reactor than in a continuous reactor. The activity of perchloric acid-activated Aerosil was 30 times greater than that of Aerosil activated with sulfuric acid. Figures 5; references 5 (Russian).

UDC [661.723-13.002.68:628.542].001

Reason for Formation of Chlorine in Thermal Neutralization of Liquid Chlorocarbon Wastes

18410193e Moscow *KHIMICHESKAYA PROMYSHLENNOST* in Russian No 3, Mar 89
pp 178-182

[Article by S. G. Bashkirova, A. M. Savchuk, T. A. Solovyeva, V. Ya. Libman]

[Abstract] An estimate is presented of the quantity of chlorine generated upon thermal neutralization of chlorocarbon wastes and its change as flue gases are cooled. Calculations were performed for the operating conditions of an existing liquid chlorocarbon waste combustion unit designed by the institute GosNIIkhlorsroyetk and featuring high-temperature oxidation of wastes in a cyclone furnace, a flue gas temperature of 1400+/-50°C, and an excess air factor of 1.7-1.8. A heat-recovery system decreases the flue gas temperature by roughly 260°C. It was found that dissociation of chlorine modifies the equilibrium of the Deacon reaction at temperatures above 1000°C considerably. The study indicates that the reason for the high chlorine content in the flue gases at the heat-recovery unit outlet is associated with the initial state, i.e., virtually all the chlorine forms right in the furnace. Jumps in chlorine concentration may be due to the catalytic effect of the iron and the iron derivatives in the waste. The authors feel that the flue gases should not be chilled in the process of chlorocarbon neutralization. Figures 3; references 10: 9 Russian, 1 Western.

UDC 66.074.34

Purification of Gases to Remove Alkaline Components

18410193f Moscow *KHIMICHESKAYA PROMYSHLENNOST* in Russian No 3, Mar 89
pp 182-183

[Article by G. A. Vlasov, K. I. Frolov, G. I. Buravtseva]

[Abstract] A study is made of the possibility of producing chemosorbents for purification of alkaline gases by esterification of wood pulp with a mixture of an oxygen-containing mineral acid and aliphatic alcohol. Conifer wood chips or sawdust, concentrated sulfuric or phosphoric acid, and tert-butyl, isopropyl, or 2-ethylhexyl alcohol were used. The molar acid:alcohol ratio was 1:1 or 3:1 in the experiments performed. The wood wastes treated with mineral acid and aliphatic alcohol were found to have good chemisorption properties for ammonia and particularly amines. The dynamic capacity of the sorbents for ammonia was considerably greater than the KSM silica gel and KU-2 cationite that are now in use. Sulfuric acid with molar acid:alcohol ratio 3:1 was preferred in the preparation of the sorbents, but increasing the ratio resulted in lower physical strength because of the destruction of the wood. Spent sorbent can be regenerated by washing in hot water, drying in air and treatment with acid esters. However, this decreases the strength of the sorbent, and large quantities of washwater (3-5 tons for every ton of sorbent) are contaminated. The authors suggest that, because the sorbents are cheap, they should be burned or dumped rather than regenerated after use. References 6: 5 Russian, 1 Western.

UDC 661.632.061:532.730.739.2

Use of Solubility Diagrams in Designing Phosphoric Acid Decomposition Processes for Low-Grade Phosphates

18410193i Moscow *KHIMICHESKAYA PROMYSHLENNOST* in Russian No 3, Mar 89
pp 191-194

[Article by I. M. Astrelin, V. G. Bogachev, Yu. A. Omelchenko]

[Abstract] The task of this study was to develop a method for using phase diagrams to determine the degree of phosphoric acid decomposition of low-grade phosphate raw material, with allowance made for the effect of impurities. Equations are suggested for determination of the course of decomposition of various types of raw materials. The equations consider the change in relationship of the masses of the reacting components as CO₂ is removed and phosphoric acid is inactivated by the impurities. The calculated and experimental data agreed well, indicating that the method suggested can be used to compute the decomposition of low-grade phosphate raw materials by phosphoric acid. Figures 3; references 4 (Russian).

UDC 661.634.2.004.82:621.796 661.185.1

Influence of Surfactants on Hydraulic Storage of Phosphogypsum

18410193k Moscow *KHIMICHESKAYA PROMYSHLENNOST* in Russian No 3, Mar 89
pp 207-208

[Article by B. B. Kopyleva, S. I. Stepanov]

[Abstract] A study was performed to determine the influence of surfactants used to intensify the process of production of extraction phosphoric acid on hydraulic storage and the condition of phosphogypsum containing residual surfactant in storage dumps. Studies of particle size distribution showed a decrease in the content of fines of less than 0.032 mm diameter and an increase in the content of particles in the 0.032-0.050 mm range.

The filtration factor remained practically unchanged. The studies indicate that introduction of the surfactants does not influence drying of the phosphogypsum in storage piles. The presence of the surfactants does not cause deterioration in the quality of stored phosphogypsum, and it improves the conditions of utilization of hydrotransport and storage systems. References 7: Russian.

UDC 541.182:537.213

Electrostatic Interaction of Colloidal Particles and Deviations From Electroneutrality in Their Double Layers

18410200A Moscow KOLLOIDNYY ZHURNAL in Russian Vol 51 No 2, Mar-Apr 89 (Manuscript received 19 Feb 87), pp 244-254

[Article by S. S. Dukhin and G. Liklema, Institute of Colloid Chemistry and Water Chemistry, Ukrainian Academy of Sciences, Kiev]

[Abstract] A double-layer model is studied in which the counterions are located both in the diffuse and in the compact parts to determine deviations from electroneutrality upon the interaction of plate-shaped and spheroidal particles. A mathematical proof of disruption of electroneutrality is presented, and the distribution of potential in the plane-parallel interphase film is computed by ignoring the deviation of the film from electroneutrality, after which the influence of the deviation from electroneutrality on the Stern potential is calculated. A condition is presented that makes it possible to ignore the deviation from electroneutrality for spherical particles. References 12: 6 Russian, 6 Western.

UDC 541.18.047.6:537.363

Regulating Process of Electrophoretic Precipitation in Nonpolar Media. Specifics of Formation of Electrophoretic Precipitate on Electrodes With Varying Conductivity

18410200B Moscow KOLLOIDNYY ZHURNAL in Russian Vol 51 No 2 Mar-Apr 89 (Manuscript received 4 Jan 88), pp 255-262

[Article by T. A. Zharinova, A. A. Malyshev, and N. M. Semenikhin, Institute of Colloid Chemistry and Water Chemistry, Ukrainian Academy of Sciences, Kiev]

[Abstract] A study is presented of the collective interaction of the particles of a hydrocarbon dispersion near and on electrodes of various types during the process of the formation of an electrophoretic precipitate. Suspensions of nickel, zinc sulfide, epoxy resin, SiO_2 , polypropylene, polycarbonate, and polyamide in hexane were studied. The mean particle diameter was 10-15 μm (0.95-0.1 μm for SiO_2). The surfactant used was barium di(2-ethylhexyl)dithiophosphate. Studies were performed on brass, glass, and polymer electrodes. The mechanism studied considers the dipole-dipole, adhesion, electrostatic, and gravitational interactions among particles and with the electrode. Water is found to change the interactions among particles and with the electrode. The surface tension at the interface between the solution and the water film is calculated by using an equation that yields values similar to the experimental values. Figures 5; References 8: 6 Russian, 2 Western.

UDC 532.74:543.422

Determining Degree of Association of Molecules in Solutions by Spectroscopic Methods

18410200C Moscow KOLLOIDNYY ZHURNAL in Russian Vol 51 No 2, Mar-Apr 89 (Manuscript received 17 Aug 87), pp 263-271

[Article by Ye. V. Ivanova, A. A. Abramzon, and V. A. Pankratov, Leningrad Institute of Technology imeni Lensovet]

[Abstract] The critical micelle formation concentrations of carboxylic acids and alcohols were determined experimentally and theoretically, with the experimental studies being performed by interferometry and light-scattering in combination with solubilization of a dye. NMR studies were used to investigate the association of carboxylic acids and alcohols in cyclohexane. The experimental data were interpreted by the method of least squares to minimize the divergence between observed and calculated data. NMR spectroscopy is found to be successful for determining the critical micelle formation concentration only if the standard free energy differs significantly from that of the formation of low-order associates, while IR spectroscopy cannot be used for this purpose at all since existing models of the number of molecules in a micelle are inaccurate. Figures 3; References 19: 11 Russian, 7 Western.

UDC 541.182:546.284

Formation and Development of Aggregates of Primary Particles in Formation of Silica Gels

18410200D Moscow KOLLOIDNYY ZHURNAL in Russian Vol 51 No 2, Mar-Apr 89 (Manuscript received 23 Feb 87), pp 272-277

[Article by T. M. Karnaukhova and N. K. Ivanov, Tyumen University; Western Siberian Scientific Research Institute]

[Abstract] A study is made of the process of gel formation in alkaline silicate solutions that have been acidified with a solution of sulfuric or hydrochloric acid to various pH levels. Turbidity spectra were used to compute the relative volume of scattering centers filled with primary amorphous silica particles; some concentration of amorphous silica was found in the volume of the scattering centers. As the system ages, the mean size of the scattering centers increases, and the quantity of silica they contain decreases and approaches (at the limit) the overall concentration of silica in the system. The relative index of refraction of the scattering centers also drops toward 1. Figure 1; References 9: Russian.

UDC 678.046.361:539.8

Change in Silica Gel Texture Upon Machining in Centrifugal Planetary Mill

18410200E Moscow KOLLOIDNYY ZHURNAL
in Russian Vol 51 No 2 Mar-Apr 89 (Manuscript
received 2 Mar 87), pp 278-283

[Article by D. P. Klevtsov, V. B. Fenelonov, V. Yu. Gavrilov, B. P. Zolotovskiy, G. I. Goldenberg, and Z. A. Dovbiy, Institute of Catalysis, Siberian Division, USSR Academy of Sciences, Novosibirsk]

[Abstract] A study is made of the changes in texture of highly porous bodies during intensive grinding in a planetary mill. Primary attention is given to changes in texture in the area of pores up to 120 nm in diameter. Studies are performed on specimens of KSK silica gel produced by preliminary grinding of the initial granules in a mortar and selecting a fraction less than 250 μm in diameter that is subsequently dried at 353 K and milled for 1-60 minutes in the centrifugal planetary mill. Three characteristic stages in the process are distinguished: the formation of relatively large fragments that retain the texture of the initial silica gel plus finer particles with a denser primary globule packing, aggregation of the smaller particles, and compacting of the aggregates formed. The description of the processes and corresponding changes in the texture are used to describe the machining of other brittle porous materials that are not complicated by phase transitions. Figures 3; References 10: 8 Russian, 2 Western.

UDC 541.183:553.612

Surface Hydroxyl Groups of Kaolinite

18410200F Moscow KOLLOIDNYY ZHURNAL
in Russian Vol 51 No 2, Mar-Apr 89 (Manuscript
received 16 Feb 87), pp 318-324

[Article by Yu. I. Tarasevich, Institute of Colloid Chemistry and Water Chemistry, Ukrainian Academy of Sciences, Kiev]

[Abstract] Types of hydroxyl groups and local concentrations of the groups on various faces of kaolinite crystals are discussed. Silicon and aluminum hydroxide groups on the prismatic faces are distinguished and their local concentrations estimated. The nonstoichiometric isomorphism causes a portion of the silicon hydroxide groups to have strongly expressed acidic characteristics. The basal Al_2OH faces of the kaolinite particles are contaminated with both silicon and the amorphous products of weathering of the kaolinite such as aluminosilica gel. References 26: 17 Russian, 9 Western.

UDC 543.423:546.34

Metrologic Support of Analytic Monitoring of Stoichiometric Composition of Lithium Niobate

18410215E Moscow ZHURNAL ANALITICHESKOY
KHIMII in Russian Vol 44 No 4 Apr 89 (Manuscript
received 9 Feb 88) pp 655-660

[Article by E. S. Zolotovitskaya, V. G. Potapova, and A. B. Blank, Monokristallreaktiv Scientific Production Association, Kharkov]

[Abstract] Lithium niobate is used as an example to show the capabilities of the atomic emission method of analysis. The analysis algorithm used allows the achievement of a minimum determination error. A reliable method is developed for calibration of the spectrophotometer, and the usage characteristics of flame-photometric instruments are estimated. The results obtained are used to certify standard specimens and a method for determining lithium at 4.3 to 4.9 mass percent in lithium niobate. The convergence of the determination results is independent of the specimen preparation method and the instrument used. The relative standard deviation for the entire range of content is 0.011-0.014. The results of the determination are normally distributed. Figure 1; References 7: Russian.

UDC 546

Spatial Structure and Concentration Limits of Combustion of Low- Gas Systems

18410185C Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 305 No 2, Mar 89 (Manuscript received 71 Nov 88), pp 386-390

[Article by Yu. V. Frolov and B. Ye. Nikolskiy, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] Critical conditions are studied for the combustion of heterogeneous condensed systems that take into account combustion thresholds. Mixed metal-metal and metal-nonmetal systems were studied in which the components interact essentially on their contact surfaces. Experimental data on concentration limits of combustion are compared with combustion thresholds calculated according to percolation theory and the properties of the specific compositions studied. A relationship is found between the concentration limits of the combustion of heterogeneous condensed systems containing little gas and their spatial structure. The limits of combustion of such compositions correspond to the formation of a connected three-dimensional structure through one of the reacting components and the achievement of conditions of continuity of the reaction surface within the system as a whole. This occurs when a threshold value is reached for the concentration of the energy-containing component, 13-19 percent of the total system volume. References 15: 14 Russian, 1 Western.

UDC 543.874.001.24

Method of Computing Flash Point and Lower Temperature Limit of Flame Propagation in Multicomponent Flammable Liquids

18410193g Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 89 pp 183-185

[Article by Ye. R. Nazin, I. V. Karpukhina]

[Abstract] Experimental determination of the flash point and the lower and upper temperature limits of flame propagation—the principal parameters that characterize the fire safety of chemicals—is generally labor-intensive and generally requires large amounts of the chemical. The methods suggested by GOST [All-Union State Standards] also use boiling point to characterize flammability, but the boiling point is unknown in many mixtures and fluctuates in others. This makes the development of better methods to compute such characteristics for flammable liquids and their mixtures a pressing problem. The authors suggest a modified method that includes a coefficient which varies with the boiling point and concentration of each component included in the mixture. The method is simpler and more universal than the present method. Experimental and calculated flash points and minimum flame propagation temperatures are presented for a number of flammable liquid mixtures. References 7: 6 Russian, 1 Western.

UDC 622.782/.784

Beneficiation of Kyzylkumy Deposit Phosphorites by Roasting

18410193h Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 89 pp 187-189

[Article by S. F. Shinkorenko, S. V. Khryashchev, T. G. Mikhaylova, T. T. Levkina]

[Abstract] The principal components of Kyzylkumy phosphorites are phosphate and calcite (80-85%), with the remainder consisting of quartz, feldspar, clay and iron-containing minerals, dolomite, gypsum, halite and some organic matter. Mineral and chemical compositions are noted. Laboratory studies have shown that effective beneficiation of these phosphorites can be achieved by wet disintegration and screening, yielding a product containing the following, in percent by mass: P_2O_5 , 22.80; CO_2 , 10.00; CaO , 43.40; MgO , 0.73; Fe_2O_3 , 0.90; Al_2O_3 , 0.28; F , 2.90; S_{tot} , 1.20; organics 7.40; calcination loss, 14.90. This intermediate product was roasted in a rotating tube furnace at 960-970°C for 35-40 minutes, which decreased the CO_2 content to 1-1.5%, yielding a material suitable for further use. Figures 3.

UDC 541.128:543.42:536.46:537.212

Effect of Nitrogen on Distribution of Active Centers and on Electrophysical Parameters in Propane-Butane-Air Mixture Flame

18410214d Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 63 No 4, Apr 89 (manuscript received 30 Sep 87) pp 1091-1095

[Abstract] Article by V. I. Botova and B. S. Fialkov, Chemical Metallurgy Institute, KazSSR Academy of Sciences, Karabanda]

[Abstract] The effect obtained by substituting argon for nitrogen on the characteristics of the combustion process was studied: the distribution of H atoms; the distribution of free radicals; and physical parameters, including temperature, pressure, and ionization. Laminar kinetic flames of propane and butane mixtures with oxygen and nitrogen were studied. It was shown that nitrogen reacting with intermediate products of hydrocarbon oxidation inhibited the combustion process, thus lowering the intensity of the ionization phenomena. In presence of nitrogen, processes occur at the front and on the periphery of the flame that compete with the oxidation of hydrocarbons. Replacement of N_2 by Ar removes these reactions from the system, which returns to oxidation of the remaining fragments. Different behavior was observed depending on the richness of the flames (on whether there was a deficit or excess of the available oxygen). In general, N_2 inhibited the combustion process. Figures 5; references 8: 5 Russian, 3 Western.

UDC 541.13

Stability of Reductive Adsorption of Noble Metal Ions on Surface of Carbon Adsorbent

18410173c Kiev UKRAINSKIY KHIMICHESKIY
ZHURNAL in Russian Vol 55 No 3, Mar 89
(manuscript received 23 Oct 87) pp 249-255

[Article by Yu. A. Tarasenko, G. V. Reznik, and A. A. Bagreyev, Institute of General and Inorganic Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] A mathematical analysis was conducted of the electrochemical processes in which ions of noble metals are reduced to the metallic state during adsorption on activated carbon. The analytical approach, which covers a number of parameters such as the nature of the noble metal, carbon characteristics, and the solvent used, relied on the mathematical apparatus applicable to non-equilibrium thermodynamics. Good agreement was obtained between the theoretical analysis and actual adsorptive reduction of palladium ions to the metal form, which showed that two concurrent stable states are possible in the palladium-carbon system. In one state, palladium is reduced in parallel with the oxygen reduction; in the other, it is oxidized and gives up an electron to the concurrent process. Figures 2; references 12 (Russian).

UDC 541.138.3

Kinetics of Electrolytic Reduction of Zinc Ions on Amalgam and Polycrystalline Electrodes

18410173d Kiev UKRAINSKIY KHIMICHESKIY
ZHURNAL in Russian Vol 55 No 3, Mar 89
(manuscript received 8 Jan 88) pp 255-257

[Article by S. A. Panasenko, V. I. Grishchuk, M. V. Kirsanov, N. N. Oleshchenko, V. P. Oleynik, D. A. Sukhomlin, and N. N. Makarchenko, Dnepropetrovsk Institute of Chemical Technology]

[Abstract] A comparative analysis was conducted of the electrolytic reduction of Zn ions on amalgam and polycrystalline electrodes. A coulometric methodology was used. Determinations of certain key parameters showed that the rate constant, transfer coefficient, heat of activation, and preexponential factor for the amalgam electrode were, respectively, 5×10^{-3} cm/s, 0.4, 47 kJ/mol, and 8×10^5 cm/s. The corresponding values obtained for the polycrystalline (solid) electrode were 7×10^{-7} cm/s, 0.5, 28 kJ/mol, and 6×10^{-2} cm/s. In conjunction with PMR data, the difference in the preexponential factor for the two electrodes showed that a difference in the structure of water on the electrode surface was responsible for the lower rate constant on the solid electrode. Figures 1; tables 1; references 12: 8 Russian, 4 Western.

Enterprising Have Gold Under Their Feet

18410176f Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 24 Mar 89 p 2

[Article by special correspondent V. Semenov]

[Text] Oh, how unwilling he was to tell about it. Every time, N. Danilov replied the following to my calls: "What are you doing to me? You cannot write about it yet. We shall lose everything. Please wait a while." No, the first deputy chairman of the Nizhniy Tagil Gornopolkom is not a play-it-safe person. Indeed, the matter was so unusual, and the attitudes of high authorities toward it was so complex and uncertain that the thin thread of the windfall success could break in any Moscow office. Nikolay Igorevich had decided nothing more and nothing less than to exchange the gold, which, as we know, is a state monopoly, for hard currency.

But let us go to the beginning of the story of how the city had come by the yellow metal.

The press, including our paper, has already discussed the extremely worrisome ecological situation of Nizhniy Tagil, where emissions from the industrial giants located here are several times the permissible concentrations of harmful substances. The smog hanging over the houses forced the inhabitants to organize rallies. The first deputy chairman of the executive committee became one of the most active fighters for a clean city. Two old coke oven batteries of the metallurgical combine were closed under pressure from the community. The new 10th battery was examined by experts. Its start-up was removed from the plan because work on its antipollution equipment had to be completed. A program of ecological improvements was adopted by the city council. Favorable conditions were created for cleaning of the Tagil river flowing through the center of the city. Over a period of many years, the river had become a virtual store of chemicals.

"At one time we tried to clean the river with clamshell buckets, but this was ineffective", related N. Danilov. "We tried several kinds, and we realized that either a dredge or a hydraulic excavator was required. At that time we were already in touch with the freelance prospectors' cooperative of the Uralzoloto Association. I told them: 'There is gold deep below the river bottom surface. When I was young, I myself saw how gold was extracted from the dredge. The bottom surface also contains gold, so there must be gold also in between'."

Discussions with the USSR Ministry of Nonferrous Metallurgy took almost a year. Then technical problems began to arise one after another. But when finally the cooperative people excavated a canal and let the river flow through it, they saw a black bottom covered with a meter-thick deposit. They removed all this mess, as Danilov calls it, and stockpiled it, and they graded the top for the gold recovery zone.

And the Tagil river returned to the condition in which it was during the time of Yermak—up to 100 meters wide

and up to 5 meters deep. In order to deepen the river bed, it was necessary to remove the sand as well as the sludge, and the sand contained several kilograms of gold.

Danilov conceived the idea of exchanging the gold for hard currency in order to purchase medical equipment for the city.

This episode demonstrated not only Danilov's willingness to employ nonstandard solutions but also his ability to persist in his purpose. He attributes his unusual operation directly to the concept of municipal economic accountability, the implementation of which has begun with the establishment of the Territorial Interbranch Housing and Municipal Services Association.

Scientists have calculated the cost of providing normal living conditions for every Tagil citizen. This is the standard for economic relationships between the council and the workers' collectives. A contractual system between the enterprises and the city council was introduced. Norms for payments to the local budget for the use of various resources were developed. A city "savings account"—a fund for the development of the city's economy—was established.

"What is the nature of the drama of the local councils?," muses Nikolay Igorevich. "We always stressed the executive functions, whereas the council, I am convinced, should be regarded as an economic organization. Our territorial interbranch association is, if you please, a kind of a stock company that solves the city's internal problems. In essence, we have given birth to a new form of property—the city property. You will not find it in any political economics textbook, but cities need it as much as they need air, particularly cities such as Nizhniy Tagil. It is not a question of replacing the dictates of government departments by the dictates of the territory, as is proposed by the Baltic comrades. It is an entirely different principle: economic collaboration within a single economic system—the city."

Production of gate valves and nonstandard equipment was organized in Nizhniy Tagil at the expense of the shareholder enterprises, by using their funds. A scientific and production cooperative Ekonom [economist] and a cooperative Teplotekhnik [heat engineer] were established and attached to the territorial association. Building and repair of roads was started. A cooperative for reconstruction of housing was planned. In general, having pooled the enterprises' money, today the City Executive Committee is organizing a whole series of production facilities needed by the city. And the housing and communal services association is not only paying for itself but is producing a profit, which is used for scientific studies.

First deputy chairman of the city executive committee N. Danilov has been nominated as candidate for the office of people's deputy of the USSR. If I lived in Nizhniy Tagil, I would vote for him.

UDC 541.18.047.6

Electrochemical Breakdown of Oil-Water Emulsion of Spent Cutting Fluids

18410180j Kiev *KHIMIYA I TEKHOLOGIYA VODY* in Russian Vol 11 No 3, Mar 89 (manuscript received 24 Feb 88) pp 269-271

[Article by A. A. Smirnov, A. G. Liakumovich, I. Yu. Averko-Antonovich, V. V. Kofanov, S. V. Lagun, Kazan Institute of Chemical Technology]

[Abstract] A study is made of the possibility of breaking down oil-water emulsions of spent cutting fluids by treatment in an electrolyzer with insoluble graphite electrodes. The combined effect of added inorganic coagulants and a DC electric field was also studied. A 200-cm³ acrylic plastic electrolyzer with a diaphragm of cotton fabric belting duck and with carbon electrodes 0.8 cm thick and 90 cm² in surface area was used. Both electrical breakdown of liquid films and dipole attraction among the particles due to polarization of the double electrical layer act to break down emulsions when an external potential difference is applied. The studies showed that in the absence of an electrical current, aluminum sulfate in a concentration of 40-50 g/l had the greatest capacity to break down an emulsion. The addition of a coagulant cannot by itself achieve separation with sufficient speed, but when combined with an electric current, it speeds sedimentation and assures more complete breakdown of the emulsion. This combined treatment, followed by ultrafiltration, can eliminate traces of calcium oxide and sparingly soluble copper compounds formed in the process. Figure 1; references 10: 9 Russian, 1 Western.

Water Pollution Emergency at Soviet Gold Mining Plant

18410226a Moscow *SOTSIALISTICHESKAYA INDUSTRIYA* in Russian 12 May 89, p 4

[Article by correspondent A. Terekhin of Chelyabinsk Oblast: "Emergency Situation at Black Brook; first paragraph is *SOTSIALISTICHESKAYA INDUSTRIYA* introduction]

[Text] The flood waters and the mine waters washed away the dike of the sludge pond of the gold extraction factory. Water and liquid sludge with a high content of cyanides rushed into the gulf. At the Yuzhuralzoloto Association an alarm was sounded. After around half a day, the breach in the dike was repaired. According to tentative estimates, roughly 36,000 cubic meters of poisonous effluent escaped into the reservoir of the city of Yuzhnouralsk through Black Brook.

A dangerous situation had come into being. The leaders of the city of Plast, where the factory was located, and those of neighboring Yuzhnouralsk were informed of the

accident only many hours after the rupture was repaired. And only at this time did the respective service organizations learn of the alarm.

Let me say in advance: no one suffered from the accident. The quality of water in the Yuzhnouralsk reservoir was checked, albeit with much delay. When the content of cyanides exceeded the maximum allowable concentrations, the water intake was halted.

"The main thing for me was to repair the dike," said A. Bokov, general director of the Yuzhuralzoloto Association, in response to my question. And that is why the notification of the municipal authorities was slow in coming.

Slow in coming....

But the leaders of the factory in the time leading up to the flood period revealed complacency, assuring the members of the city flood commission that the condition of the dike was nothing to be afraid of!

Major pollution of the Yuzhnouralsk water reservoir was prevented by the fact that a pond lay in the path of the contaminated effluent and captured most of it. The content of cyanides in the pond is now tens of times greater than in the hygiene standards.

"The pond is more than full, and water is still coming in," says V. Voronin, chairman of the commission for cleanup of the accident and vice chairman of the Plast city executive committee. "It is urgently necessary to make the dike higher."

On my way back to Chelyabinsk from Plast I paid a visit to this pond. It was 6 o'clock in the evening. Three tractors were parked at the pond, looking forlorn. A young man—standing guard—said that the drivers had gone away 2 hours ago.

I walked over to the dike. A narrow strip of freshly piled clay. It was less than a few dozen centimeters from the top edge to the water surface....

UDC 628.33

Possibility of Using Tkibuli Deposit Coal to Remove Petroleum Products and Oils from Industrial Wastewater

18410180hH Kiev *KHIMIYA I TEKHOLOGIYA VODY* in Russian Vol 11 No 3, Mar 89 (manuscript received 25 Apr 88) pp 261-263

[Article by I. L. Ettinger, T. M. Danelishvili, Institute of Problems of Complex Utilization of Mineral Resources, USSR Academy of Sciences, Moscow]

[Abstract] A study was made of the possibility of using inexpensive, moderately porous Georgian deposit coals for sorption purification of industrial wastewater and rainwater runoff. The need for additional purification was demonstrated by studying wastewater dumped into the sea after purification at the Batumi oil refinery. The

standard methods were found unable to lower the content of the petroleum products to the maximum permissible concentration. The data indicated that filtration through the moderately porous Tkibuli deposit coal was extremely effective for oil, as well as for petroleum products. However, the results were not stable for the petroleum products and were found to vary with the mass of coal in the filter, initial concentration acidity and other factors. The technology of use of the coal must be further studied and refined to yield more consistent satisfactory results. References 9 (Russian).

UDC 628.16.165

Processing of Solutions After Desalination of Sulfate-Chloride Mineralized Water

18410180i Kiev *KHIMIYA I TEKHOLOGIYA VODY* in Russian Vol 11 No 3, Mar 89 (manuscript received 25 Mar 88) pp 263-266

[Article by V. I. Maksin, Ye. V. Skorobogach, Institute of Colloidal Chemistry and Hydrochemistry imeni A. V. Dumansky, Ukrainian Academy of Sciences, Kiev]

[Abstract] Since it is no longer permissible to dump salt solutions from desalination installations into natural water bodies, the problem of utilizing and liquidating these runoffs is quite pressing and potentially costly. This article studied the processing of a low-concentration solution (3.95% Na_2SO_4 , 1.08% NaCl , 94.9% H_2O) obtained after desalination by electrodialysis or reverse osmosis of mineralized mine water. Direct separation of salts without concentration is impossible, and concentration by freezing of ice is, for small volumes ($25\text{--}40\text{ m}^3/\text{hr}$), less effective than evaporation or saturation of one salt to separate another. Equilibrium diagram analysis of four variations for solution concentration used in conjunction with subsequent processing indicated that the best variation involved (1) evaporation without achieving saturation, (2) complete saturation with sodium chloride, (3) crystallization of mirabilite upon cooling, and (4) evaporation of the remaining parent solution to produce sodium chloride. Its superiority is based on its ability to perform power-intensive processes with relatively small volumes of solution. Figures 1; references 10 (Russian).

UDC 579.695

Microbiological Removal of Anionic Surfactants From Industrial Wastewater and Runoff

18410180k Kiev *KHIMIYA I TEKHOLOGIYA VODY* in Russian Vol 11 No 3, Mar 89 (manuscript received 22 Jun 88) pp 272-274

[Article by S. S. Stavskaya, I. A. Krivets, T. Yu. Grigoryeva, L. S. Samoylenko, N. I. Nastoyashchaya, Institute of Colloidal Chemistry and Hydrochemistry imeni A. V. Dumanskiy, USSR Academy of Sciences, Kiev]

[Abstract] The purpose of this work was to test the effectiveness of microbiological removal of anionic surfactants from the wastewaters of various enterprises and to determine the basic parameters required for processing industrial wastewater. Microbiological purification was performed in the laboratory in batch and continuous bioreactors using a strain of *Pseudomonas alcaligenes* TR, plus a bacterial complex that consisted of *Pseudomonas* sp. 2T/1, *P. rathonis* T, and *P. putida* K. The cleaning agent in wastewater that also contained nitrogen and phosphorus salts was completely broken down in a batch reactor in two days when the cleaning agent's initial concentration was 0.2 g/dm^3 . Amounts of $8\text{--}25\text{ mg/dm}^3$ remained after five days when the initial concentration was 0.5 and 0.9 g/dm^3 . After $8\text{--}19$ hours in a continuous reactor, $95\text{--}98\%$ of the cleaning agent was removed when the initial concentration of the surfactant was $525\text{--}900\text{ mg/dm}^3$; $10\text{--}30\text{ mg/dm}^3$ remained. Runoff was treated in a column-type bioreactor with immobilized destructor-bacteria *Pseudomonas* sp. 2T/1, *P. rathonis* T, and *P. putida* K. The purification level reached $94.7\text{--}98.8\%$, with no foaming and a neutral pH. After 10 hours in the reactor, surfactant concentrations of $0.25\text{--}0.4\text{ g/dm}^3$ were reduced to levels that can be handled by municipal purification facilities (0.02 g/dm^3 or less). Larger initial concentrations required longer periods in the reactor. The *P. alcaligenes* TR was used to remove surfactants with heavy metal ions. On activated carbon, the strain removed 100% of the sulfonol in galvanizing wastewater. Its performance on other carriers was also high ($95\text{--}97\%$), but dropped $15\text{--}20\%$ when the flow rate of the reactor was accelerated to $4.2\text{ dm}^3/\text{day}$ from 1.8 . References 4 (Russian).

UDC 546.171.1:538.2

Magnetic Precipitation of Highly Dispersed Waste Gas Particulate Impurities From Welding Production

18410205A Kiev *KHIMICHESKAYA TEKHOLOGIYA* in Russian No 2 Mar-Apr 89 (Manuscript received 9 Mar 88) pp 51-53

[Article by A. V. Sandulyak, I. B. Lozin, M. I. Pavlishchev, A. L. Yershov, and L. N. Malinskiy, Institute of Water Management, Rovno]

[Abstract] A study was made of the influence of the active parameters contained in an equation suggested in a previous work by one of the authors to describe the process of magnetic precipitation on the effectiveness of the precipitation of impurities. The experimental installation used consisted of a cylindrical body of a nonferromagnetic material containing a steel ball packing. Both permanent magnets and electromagnets connected to a DC source were used to provide the magnetism. The studies were performed on an aerosol collected from a welding machine. The equation was found to be suitable to predict purification effectiveness or to select the mode parameters of a magnetic filtration system as functions of the required purification effectiveness with known

particle dimensions and magnetic properties. A 95 percent purification was achieved for the following parameters: $d = 3$ mm, $v = 0.25$ m/s, $L = 0.4$ m, $H = 80$ kA/m. Figures 4; References 9: Russian.

UDC 613.634:576.75

Methodic and Methodologic Problems of Evaluating Combined Health Effects of Chemical Substances

18410205C Kiev *KHIMICHESKAYA TEKHNLOGIYA* in Russian No 2 Mar-Apr 89 (Manuscript received 22 Aug 86) pp 79-85

[Article by I. G. Kopeyka, Institute of Gas, Ukrainian Academy of Sciences, Kiev]

[Abstract] The method of the mathematical planning of a multifactor experiment was used to study and quantitatively evaluate the combined effects of several chemical substances on the body. Four series of laboratory experiments on animals were used for three different groups of substances. Coefficients were computed for incomplete nonlinear regression equations for the dimensionless responses as functions of the variable factors, the concentration of the chemical substances (CO , H_2S , CS_2 , C_6H_{12} , and C_7H_{14}). The equations remain largely unchanged for the various groups of factors in terms of responses of the hematopoietic, immune, and nervous systems. The analysis demonstrated that results obtained in studies of the combined effects of chemical substances on particular responses cannot be extrapolated to the level of the entire body without deep analysis of the regularities and mechanisms of the systemic organization of the particular responses and their significance in adaptation, compensation, or injury to the organism. Figure 1; References 5: Russian.

UDC 541.128.13+66.074.38

Intensification of Catalytic Purification of Gas Exhausts To Remove Hydrocarbon Impurities

18410205E Kiev *KHIMICHESKAYA TEKHNLOGIYA* in Russian No 2 Mar-Apr 89 (Manuscript received 21 Nov 86) pp 91-95

[Article by V. M. Vlasenko, V. Ya. Volfson, S. A. Solovyev, Institute of Physical Chemistry, Ukrainian Academy of Sciences, Kiev]

[Abstract] Processes of catalytic gas purification can be intensified by introducing substances to the reaction mixture that are converted at low temperatures but liberate large quantities of heat during conversion to intensify the conversion of the other toxic substances present. For example, hydrogen can be added to the reaction mixture to remove benzene from air on a palladium-manganese catalyst. Heterogeneous-catalytic decomposition of ozone, yielding atomic oxygen, can also be used for the same purpose. The application of an active mass onto a carrier such as $\gamma\text{-Al}_2\text{O}_3$ or mordenite

can increase the sorption capacity of adsorbent catalysts. Figures 4; References 18: 16 Russian, 2 Western.

UDC 621.928.97

Small Gas-Purification Apparatus

18410205F Kiev *KHIMICHESKAYA TEKHNLOGIYA* in Russian No 2 Mar-Apr 89 (Manuscript received 9 Oct 86) pp 96-98

[Article by V. I. Bakhtin and Yu. P. Pavlenko, Zaporozhye Industrial Institute]

[Abstract] The authors' institute has developed a small gas purification apparatus intended for installation within gas passages that requires practically no additional production area. It has been installed in natural draft gas lines and achieves up to 90-93 percent purification. However, if the technological process is stopped for any reason, moisture precipitates onto the equipment below the natural draft exhaust. Studies were performed to determine the reason for the precipitation of moisture. An equation was derived to determine the optimal parameters and geometry to avoid excessive moisture precipitation. A design of a reflecting cone and collector system is suggested for removing moisture precipitated from the gases flowing through the exhaust duct. Figures 3; References 2: Russian.

UDC 541.412:621.762

Stability of TiFe and Mg_2Ni Intermetallic Compounds in Chemically Active Gases

18410205G Kiev *KHIMICHESKAYA TEKHNLOGIYA* in Russian No 2 Mar-Apr 89 (Manuscript received 6 Jan 87) pp 99-101

[Article by M. M. Antonova, I. M. Shalya, O. T. Khorpyakov, and A. G. Shablina, Institute of Materials Science Problems, Ukrainian Academy of Sciences, Kiev]

[Abstract] The compounds mentioned in the title are used to store hydrogen for transportation. This article studies the chemical properties of these compounds, which were obtained by sintering powders of the metals in hydrogen. Powders with particle sizes of 100 μm were studied. The powders were exposed to air, stored in a dessicator, and exposed to oxygen-free dry nitrogen and CO_2 at various temperatures. The powders were found to be active substances that must be isolated from the air when transported and stored. Mg_2Ni must be stored in moistureproof packaging. Figures 2; References 2: 1 Russian, 1 Western.

UDC 546.621.226

Basic Aluminum Sulfate—Effective Coagulant for Water Purification

18410205H Kiev *KHIMICHESKAYA
TEKHNOLOGIYA* in Russian No 2 Mar-Apr 89
(Manuscript received 18 Sep 86) pp 102-05

[Article by A. K. Zapolskiy, L. A. Bondar, and I. I. Deshko, Institute of Colloid Chemistry and Water Chemistry, Ukrainian Academy of Sciences, Kiev]

[Abstract] The authors studied interactions in the system $Al_2(SO_4)_3-Al(OH)_3-H_2O$ at 110°C and determined the possibility of producing dissolved aluminum dihydroxosulfate and basic aluminum sulfates. The conditions under which these salts are produced are determined in order to study their physicochemical and coagulation properties. A technology is developed for producing basic aluminum sulfate, and its optimal parameters are developed in pilot-scale testing. The basic aluminum sulfate is found to have higher coagulation activity than aluminum sulfate has, which is presently the most widely used substance for the purification of water in the Soviet Union. The use of 10-12 mg/dm³ Al_2O_3 of the basic salt yields clarified water from the Neva River water with a higher quality in terms of all parameters tested (turbidity, color, residual aluminum) than did the same doses of aluminum sulfate. Figures 3; References 3: Russian.

UDC 678.5.02:66.074.3

Catalytic Removal of Styrene From Ventilation Gases

18410207F Moscow *PLASTICHESKIYE MASSY* in Russian No 4 Apr 89 pp 82-84

[Article by K. Dosumov, K. Zh. Kaygaltirova, A. K. Umbetkaliyev, and K. A. Altynbekova]

[Abstract] A study is made of the possibility of purifying exhaust gases by removing styrene by means of catalysts not containing platinum. Mixed palladium catalysts were used that contained 0.05 percent Pd plus multicomponent oxide catalysts. Styrene was determined colorimetrically. The gases were treated at a volumetric flow rate of 20,000 hr⁻¹, a temperature of 673 K, and a styrene content in the input gas of 225 mg/m³. Increasing the temperature to 723 K increased the degree of purification with all catalysts tested. The data indicate that the most active of the catalysts studied are the palladium catalysts type P-5 and P-4, which achieve 95-98 percent removal of styrene at 15,000-20,000 hr⁻¹, 673 K. Type P-5 catalyst was found to retain its activity and effectiveness over a period of 600 hours under these conditions. It is therefore equal in activity to type AP-56 platinum catalyst. Figures 2; References 8: 7 Russian, 1 Western.

Environmental Concerns Veto Berezovka Chemical Plant

18410176d Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 17 Mar 89 p 1

[Article by special correspondent A. Pasechnik "It Did Not Pass!"]

[Text] The fears of the Odessa citizens have been dissipated. The Berezovka Chemical Plant for the production of phosphate fertilizers was to be built in the oblast. The Review Commission of the State Committee for Environment Protection has given its final decision: The construction of the enterprise is prohibited on ecological as well as economic grounds.

For nearly a year, a broad segment of the city community, scientists, and the workers' collectives had fought the poorly conceived plan of the USSR Ministry of Fertilizers. There was a continual discussion on the pages of the local and central press. As a result, the departmental dictates have been overcome. Does this mean we can?...

And now a conclusion: The Review Commission of the USSR Gosplan has convincingly shown that there is no need to increase the number of production facilities for phosphate fertilizers. We should utilize the existing facilities more efficiently and update them. But the following question also arises: Do we always evaluate departmental appetites so realistically and with such regard for the present-day conditions?

Let Us Stop Nitrate Attack

18410176e Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 11 Mar 89 p 2

[Article by A. Banin, candidate of economics sciences, docent at the Moscow National Economy Institute imeni G.V. Plekhanov; first paragraph is boldface SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] I can name several industrial production indexes that put us ahead of many highly developed countries. Other figures are really impressive. For example, we produce 1.8 times as much mineral fertilizers as the United States.

It would seem that the return from them should increase accordingly. But unfortunately, this sound logic is refuted by figures from the All-Russia Scientific Research and Design and Technology Institute for the Chemicalization of Agriculture.

Furthermore, excessive and, yes, incorrect application of fertilizers impairs and destroys the natural soil fertility. According to Professor and Doctor of Chemical Sciences M. Lemeshev, about 70 percent of arable lands are currently subjected to various forms of erosion to some degree.

But this still is not all. It is just as hard to read and hear reports that the nitrate content of food products is impermissibly high.

It would seem that it is time to consider whether we should continue to increase this insidious use of chemicals in agriculture when instead of a beneficial effect it produces problems for the society. But in spite of this, the production of chemical mineral fertilizers is increasing, and not at a slow pace. I read recently that the Norwegian concern Noshk Hydro has shipped us the equipment and technology for five plants for the production of complex fertilizers. And these costly purchases have been made when the country is experiencing an acute shortage of hard currency.

Why should we blindly run after "chemistry"? Namely, there is a sensible alternative to the production and use of mineral chemical fertilizers. And this alternative is economically and ecologically more effective. I have in mind the so-called sapropels—wastewater treatment sludges, metallurgical slags, and shale ash.

For example, the use of sapropels not only makes agricultural production ecologically sound, but at the same time their use makes it possible to solve problems associated with water supply, improvement of the hydrological conditions of territories, increased fish production, etc. And the sapropel reserves in the RSFSR alone are as large as 230 billion cubic meters. In a word, today our problem in agriculture is to make more active use of fertilizers that are harmless to human health.

Fire in Azot Production Association Fertilizer Plant in Ionava

18410176g Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 24 Mar 89 p 2

[Article by special correspondents I. Klimenko and R. Motskus, "Unprecedented Accident and Exemplary Action"; first paragraph is SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] "The Ionava accident is unprecedented. Unfortunately, we were again the first in the world to encounter such a huge quantity of chemicals burning at the same time. The situation is perhaps comparable to the unfortunate 1972 peat fire in Podmoskovye. How can the fire be put out? What can be used to put it out? Of course, while placing the ammonia and the nitrophosphate fertilizer storage areas next to one another, the scientists should have constructed a model of the probability of their fiery combination. As a professional, I must also recognize that everybody in Ionava acted in a professional manner. I would say, even in an exemplary manner, and this reduced the gravity of the consequences of such an extraordinary accident to a minimum."

This is how the accident in the Azot association in Ionava was appraised at our request by the representative of the USSR Ministry of Defense, doctor of chemical sciences colonel V. Malyshev. The deputy head of Civil Defense of our country, lieutenant-general N. Dolgin, said more briefly, "This has never happened before in the world. In my opinion, we came out of this very difficult situation with pride."

Why, we can be proud of this.... We can be proud of the fact that in the well-groomed Lithuanian Ionava (namesake of Russian Ivanovo) we have Felitsiya Kazakyavichene, senior control room worker of the Azot association, who prior to the accident was an inconspicuous woman. She was the one who was at the control panel during the time when quiet life changed to tragedy. She was the one who personally assumed the right and the responsibility for the fate of hundreds of people. Incidentally, she took the responsibility not only for their fate but for their lives. Felitsiya Kazakyavichene did what she had to do, what her job instructions told her to do. Upon receiving information about the accident, she acted without delay, did not lose her head, and did not run to get approval. (In fact, the general manager was not there.) Right on the spot, she gave the alarm and ordered the stoppage of the plant and the evacuation of the collective. We would remind you that in Chernobyl such an order was given many hours after the explosion of the reactor. After all, we do learn from tragedies.

We can be proud of the fact that the Soviet Army has lieutenant-colonel S. Grishanov. He was introduced to us as one of the active participants in the liquidation of the accident before he took us for a flight to inspect the site of the accident.

We (not the authors, but the nation) can be proud of the fact that among us we had Genrikh Narkevich—a fine young man, a professional (in the direct sense of this word) fireman, and a party candidate. Yes, to our great sorrow we had him among us. We were too late to get to know Genrikh personally. But we were in the immediate vicinity of the place where he died. We saw this inferno with our own eyes.

All this is terrifying and bitter. Alas, pride is not our only feeling. And what did happen in Ionava? A liquid ammonia storage facility exploded. This is a complex technical facility. It is like a huge thermos freezer, up to 30 meters in diameter and more than 20 meters tall. It is housed in a reinforced concrete structure resembling a glass holder—for safety. It is difficult for a nonspecialist to visualize such a huge vat. It weighs thousands of tons. It is even more difficult to visualize how such a huge object can fly up in the air and for a distance of about 50 meters.

"At the end of March," we were told by minister N. Olshanskiy, "we were planning together with civil defense to conduct a study at one of our plants in Odessa in order to develop a procedure for dealing with such accidents. The local specialists told us unanimously that such accidents are impossible."

The minister cited this case in order to illustrate the lack of preparation of personnel for the accident. Alas, this fact also characterizes the state of discipline at the enterprises of the Ministry of Fertilizers. So far it is difficult to speak about exact causes of the Azot accident. As yet, the state commission has not made its conclusions. However, the facts are as follows. The safety system at the storage building did not work. The explosion occurred at a facility that had just been inspected by the ministry's specialists who pronounced it safe to operate. This was the third accident at the enterprise during the last year. There were no casualties in the earlier accidents. The present accident has already claimed eight lives.

Fortunately for the city, the ammonia burst into flame upon explosion. If seven thousand tons of it had found its way into the river Neris, a tributary of Nemen that flows literally alongside the enterprise, the misfortune would have turned into a disaster. People prevented the disaster. But other complications had arisen here: The fire jumped to the nitrophosphate fertilizer storage facility. This fertilizer generally does not burn and is safe in certain doses, but under certain conditions, as any chemical compound, can decompose into other, very dangerous components. The fire created such conditions. A heavy toxic column rose above the storage building, which contained more than 60 tons of fertilizers. Its trail extended for tens of kilometers.

The people—more than 40,000 of them—were evacuated to safe areas. The Ionava residents were also alerted twice. But the weather was favorable. The wind was blowing away from the city. Both the central and the republic authorities acted in concert. Or, as colonel Malyshev said, they acted in an exemplary manner. But well-wishers from abroad are trying to plant information that the "center representatives" at one time interfered with the solution of the problems that had arisen. All this does not correspond to reality. And today, as never before, the people of the multinational republic demand an objective view—a view and a voice. And as an example of those "voices" we would like to cite the journalists of the republic's radio whose work on the open airwaves during those troubled days deserves recognition and approval of the population.

Wednesday evening, after we left Ionava, the radio reported: "The fire has been localized. The situation is under control." And we remembered the inferno with billowing yellow smoke, the waist-deep foam, the fire hoses crawling like snakes into smoke and foam, and the eerie gas mask-wearing figures of firemen and gas and mine rescue workers moving clumsily in this mess. We also remembered colonel Ivan Abrosimovich Baranov, the chief fireman of the republic. We remembered his frightening monologue. We shall cite only a short excerpt from it:

"I have been a fireman for 41 years, and all these years we were promised a sufficient supply of fire hoses, special clothing, special equipment, and special materials.... We saw on television that the famous Fedorov has equipped an airplane as a clinic. We have nothing against it. But neither the firemen nor the rescue workers have a special airplane."

The toxic trail over the Lithuanian land has disappeared, dissolved, dissipated. And again, just as after any accident, the trail of problems extending from Chernobyl to Ionava and beyond appeared with even more contrast and relief. Where will it appear next? Whom shall we be proud of next?

We would like to be so proud not just of the heroes.

UDC 681.32:519.24

Analysis of Influence of Sulfate-Containing Salts and Carbamide on Content of Available Form of Phosphoric Anhydride in Nitrophoska Fertilizer by "Statistical Analysis and Prediction" Application Software Package

18410193j Moscow *KHIMICHESKAYA*

PROMYSHLENNOST in Russian No 3, Mar 89

pp 196-198

[Article by N. A. Semenov, A. V. Yankov, V. N. Bogatikov, V. T. Leonov, V. M. Tarasov, N. A. Yankova]

[Abstract] The "Statistical Analysis and Prediction" application software package, which was designed to perform regression identification and prediction of time series under the YeS operating system, was used to automate processing of the results of laboratory studies analyzing the influence of sulfate-containing salts and carbamide on the content of available P_2O_5 in nitrophoska fertilizer. Analysis of the regression model obtained with the software package resulted in the following conclusions: by varying the consumption standards of nitric and sulfuric acids, the sulfuric acid norm can be reduced without disrupting the process of decomposition of the apatite concentrate; the sulfuric acid norm in the ammonization phase significantly influences the content of available P_2O_5 , but replacement of part or all of the sulfuric acid with sulfate-containing salts does not change the basic parameters of the process; introduction of carbamide to the fertilizer allows the sulfuric acid and ammonia consumption norms to be decreased without deterioration of the physical and chemical properties of the fertilizer. Figures 1; references 6 (Russian).

UDC 543.42+538.945

Microwave Response and Spatial Distribution of Local Magnetic Fields in Superconducting Ceramic

18410208B Moscow *KHIMICHESKAYA FIZIKA* in Russian Vol 8 No 4 Apr 89 (Manuscript received 18 Mar 88) pp 471-474

[Article by G. G. Lazarev, K. V. Mitsen, A. I. Smirnov, O. Ye. Yakimchenko, and Ya. S. Lebedev, Institute of Chemical Physics imeni N. N. Semenov, USSR Academy of Sciences; Institute of Physics, USSR Academy of Sciences, Moscow]

[Abstract] Quasiresonant signals generated upon scanning of a magnetic field through zero are studied. The signal is recorded in counterphase to the normal EPR spectrum. Specimens of $\text{YBa}_2\text{Cu}_3\text{O}_{7.8}$ are studied at a superconducting transition temperature of 93 K at $H_0 = 55$ gauss. The variation of microwave response at 10 GHz as a function of the magnetic field was studied at 77 K and with a modulation amplitude of 2 gauss by using spherical or cylindrical specimens. It was found that the microwave field penetrates to less than 100 μm depth. The microwave response in zero field results from the equatorial portion of the specimen surface. Freezing of the paramagnetic moment shifts the line observed. Breakup of the superconducting state begins in the equatorial portion by an unknown mechanism. Frozen local fields can create a significant shift in the quasiresonant line, particularly at low temperatures. Figures 4; References 8: 7 Russian, 1 Western.

UDC 539.264

X-Ray-Structural and EXAFS Study of Glasses in System $\text{ZrF}_4\text{-BaF}_2\text{-AlF}_3$

18410211A Leningrad *FIZIKA I KHIMIYA STEKLA* in Russian Vol 15 No 1, Jan 89 (Manuscript received 10 Nov 87) pp 23-28

[Article by A. P. Kulikov, V. K. Goncharuk, S. A. Polishchuk, and G. T. Petrovskiy, Institute of Chemistry, Far Eastern Division, USSR Academy of Sciences, Vladivostok]

[Abstract] A study was made of the local surroundings of Zr in $2\text{ZrF}_4\text{-BaF}_2$ and $2\text{ZrF}_4\text{-BaF}_2\text{-0.1AlF}_3$ glasses by two methods: x-ray diffraction and EXAFS spectroscopy, which was used in order to determine the influence of the modifier on the structure of the glass. Joint utilization of these two direct methods produces more reliable structural information since the two methods supplement each other, EXAFS being more sensitive to changes in the near surroundings of an absorbing atom, whereas diffraction allows more precise determination of the coordination spheres. The studies showed that the close order in the fluoride glasses studied can be described in terms of 7- and 8-pointed Zr-polyhedra. The polyhedrons, which are connected through one or two

fluorene atoms, form a disordered framework. Introduction of aluminum trifluoride does not change the structural motif. The Al^{3+} apparently does not replace Zr^{4+} , but rather fills the Ba^{2+} vacancies. Figures 2; references 21: 5 Russian, 16 Western.

UDC 666.11.538.6

Influence of Thermomagnetic Treatment of Glass on State of Paramagnetic Centers During Vitrification

18410211B Leningrad *FIZIKA I KHIMIYA STEKLA* in Russian Vol 15 No 1, Jan 89 (Manuscript received 17 Jun 87) pp 52-56

[Article by G. V. Zhmykhov, V. I. Borulko, I. A. Klyuchnik, V. G. Pitsyuga, G. V. Zakharov, and Ye. V. Reshetkova, Donetsk State University]

[Abstract] Results are presented from measurement of the magnetic susceptibility of $0.37\text{Na}_2\text{O}\cdot 0.63\text{SiO}_2$ glass synthesized from analytic-grade reagents in a platinum crucible at 1,400°C. The glass was ground and used to prepare specimens, the vitrification of which was performed in small crucibles in a magnetic field of 80-320 $\text{kA}\cdot\text{m}^{-1}$ at 1,200°C in a tubular furnace for 1 hour, after which the magnetic field was switched on and the specimens were cooled at a rate of 20 $\text{K}\cdot\text{min}^{-1}$ to a temperature of 500°C, after which the magnetic field was turned off and the specimens were further cooled at 5 $\text{K}\cdot\text{min}^{-1}$. Anomalous changes in the magnetic properties of the glasses were discovered and interpreted in accordance with the concept of the influence of the magnetic field on the spin-dependent recombination of nonequilibrium concentrations of paramagnetic radicals during vitrification. The studies indicate the possibility of directed formation of the structure and properties of vitreous materials. Figure 1; references 20: Russian.

UDC 539.4:539.213

Influence of Manufacturing Conditions on Strength of Quartz Glass Light Guides

18410211C Leningrad *FIZIKA I KHIMIYA STEKLA* in Russian Vol 15 No 1, Jan 89 (Manuscript received 12 Nov 87) pp 73-78

[Article by N. M. Davidovich, V. P. Pukhvshtimchenko, L. G. Baykova, T. I. Pesina, and Ye. N. Radeyeva, Institute of Physics and Technology imeni A. F. Ioffe, USSR Academy of Sciences, Leningrad]

[Abstract] Three-point bend testing virtually eliminates the influence of random defects on the measured strength values in light guide fibers and allows the distribution of strength in microscopic fiber volumes to be studied as a function of manufacturing conditions. Strength studies were performed by three-point bending with 1.1 and 0.8 mm between points and test times on the order of 10 s. Fibers 70-170 μ in diameter were studied, indicating that the strength measured in the microscopic volume produced by this testing method

and its dispersion are essentially related to the technological conditions of fiber's manufacture. It is suggested that strength dispersion in light guides results primarily from the effects of moisture on the surface of the fiber at the moment when it is drawn, and this causes a decrease in the dispersion of strength and an increase in mean strength upon transition from an oxygen-hydrogen burner to the drier atmosphere of a resistance furnace. Application of a protective coating when the fibers are drawn also significantly decreases the dispersion of strength in microscopic fiber volumes and thus increases the average strength. Figures 2; references 14: 6 Russian, 8 Western.

UDC 666.113.22

Dielectric Spectroscopy of Chalcogenide Glasses Doped With Transition Metals

18410211D Leningrad FIZIKA I KHIMIYA STEKLA in Russian Vol 15 No 1, Jan 89 (Manuscript received 8 Jul 87) pp 84-90

[Article by M. S. Gutenev, Yu. S. Tveryanovich, A. P. Krasilnikova, and V. A. Kochemirovskiy, Leningrad State University]

[Abstract] The method of dielectric spectroscopy is studied in chalcogenide glasses doped with transition metals. It is found that, within the limits of the sensitivity of the method, alloys in the system $[(As_2Se_3)_{0.7}(Cu_2Se)_{0.3}]_x-MnSe$ with 100X between 0 and 1.2, where X is the atomic fraction of Mn, are homogeneous vitreous materials. Substances with 100X between 1.2 and 1.6 contain closed microcrystalline inclusions based on compounds of manganese with a practically metal-type conductivity surrounded by an insulating layer with a thickness on the order of 10 angstrom units. Where 100X is greater than 1.6, the crystallization process encompasses a significant portion of the volume of the glass. Figures 3; references 14: 10 Russian, 4 Western.

UDC 537.2:537.22:539.8

Change in Optical Properties of Glasses Alloyed With Cerium Dioxide With Pulsed and Steady Bombardment by Moderate-Energy Electrons

18410211E Leningrad FIZIKA I KHIMIYA STEKLA in Russian Vol 15 No 1, Jan 89 (Manuscript received 26 Jun 87) pp 98-102

[Article by V. I. Korepanov, V. V. Kurenkov, V. A. Starodubtsev, and N. I. Yagushkin, Scientific Research Institute of Introscopy, Tomsk Polytechnical Institute]

[Abstract] A comparison is presented of changes in the optical properties of K-208 borosilicate glasses containing cerium oxide that are bombarded by electrons under conditions enabling and preventing accompanying discharges. The specimens were bombarded in the steady state by electrons with an energy of 100 keV in a vacuum chamber with residual gas pressure 10^{-4} Pa or by electrons with an energy of 5.8 MeV in air. The oxygen-containing inorganic glasses alloyed with cerium are found to be

radiation resistant for steady bombardment by electrons. Pulsed bombardment reveals that the primary processes of the interaction of ionizing radiation with glass form many more types of radiation color centers than under steady conditions. Short-lived optically active defects result from the presence of aluminum and sodium in the glass. Bombardment by moderate-energy electrons under radiation electrification conditions causes a significant decrease in optical transmission of the glass due to erosion and decomposition of the glass surface under the influence of electrical discharges. Figures 3; references 18: 15 Russian, 3 Western.

UDC 621.375.9:535

Temperature Variation in Optical Characteristics of Certain Laser Glasses and Crystals

18410211F Leningrad FIZIKA I KHIMIYA STEKLA in Russian Vol 15 No 1, Jan 89 (Manuscript received 23 Oct 87) pp 126-128

[Article by N. Ye. Alekseyev, Institute of Radio Engineering and Electronics, USSR Academy of Sciences, Moscow]

[Abstract] The temperature variation of the index of refraction and coefficient of linear thermal expansion α was studied by an interference method based on monitoring temperature-caused changes in the optical length of a flat Fabry-Perot interferometer containing the specimen studied, a standard active laser element 8 mm in diameter and 100 mm long. W , α , and $(+\alpha)$ were determined by independent methods. Highly homogeneous specimens were used, and temperature conditions were carefully maintained to produce measured quantities with a variation of not over 3 percent. The experimental results agree well with calculated results. References 8: 6 Russian, 2 Western.

UDC 546.659:175-386

Complex Compounds of Samarium With Alkali Metal Nitrates

18410213B Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 34 No 4, Apr 89 (Manuscript received 25 Mar 88) pp 834-839

[Article by Z. K. Odinets, N. A. Salnikova, A. K. Molodkin, and T. N. Ivanova, University of People's Friendship imeni P. Lumumba]

[Abstract] Continuing their studies of the reaction of lanthanide nitrates with alkali metal nitrates, the authors study complex compounds of samarium with alkali metal nitrates and perform their chemical analysis by the gravimetric method. The analysis indicates that the compounds produced correspond to the formulas $Li_2Sm(NO_3)_5 \cdot 4H_2O$; $Na_2Sm(NO_3)_5 \cdot 2H_2O$; $K_2Sm(NO_3)_5 \cdot H_2O$; $Rb_2Sm(NO_3)_5 \cdot 2H_2O$; and $Cs_2Sm(NO_3)_5 \cdot 2H_2O$. The indices of refraction are determined, and powder diffractograms are used to determine

the interplanar distances and the corresponding intensities. The products of the thermal decomposition of the compounds are obtained by heating to 1,100°C and holding about 2 hours to a constant mass in air. Figure 1; references 7; Russian.

UDC 536-33:541

Calorimetric Study of Reactions Forming Mixed-Ligand Complexes of Ni^{2+} , Cu^{2+} and Zn^{2+} With Iminodiacetate and Ethylene Diamine in Aqueous Solution

18410213C Moscow ZHURNAL
NEORGANICHESKOY KHIMII in Russian
Vol 34 No 4, Apr 89 (Manuscript received 22 Feb 88)
pp 853-856

[Article by Ye. V. Kozlovskiy, G. V. Chistyakova, and V. P. Vasilyev, Ivanovo Institute of Chemical Technology]

[Abstract] A study is made of the change in enthalpy and entropy in the reaction $MIda + en = MIdaen$ to determine the role of hydration, structural factors, and the mutual influence of the ligands as well as the change in stability of the mixed-ligand complexes in comparison with homogeneous substances. Calorimetric measurements were performed on an ampule calorimeter with an isothermal shell. The $\Delta_r S$ of the reactions and the formation of homogeneous complexes are calculated, and the significance of hydration of the ligands and the effect of their mutual influence in the mixed-ligand complex are determined. References 13: 11 Russian, 2 Western.

UDC 548.736+546.562

Synthesis and Structure of Copper (II) Complexes With 2-Oxyiminopropionic Acid

18410213D Moscow ZHURNAL
NEORGANICHESKOY KHIMII in Russian
Vol 34 No 4, Apr 89 (Manuscript received 7 Apr 88)
pp 873-876

[Article by Yu. A. Simonov, T. Yu. Sliva, M. D. Mazus, A. A. Dvorkin, and R. D. Lampeka, Kiev State University imeni T. G. Shevchenko; Institute of Applied Physics, Moldavian SSR]

[Abstract] A study is made of the synthesis and structure of copper (II) complexes with 2-oxyiminopropionic acid. Copper (II) compounds were synthesized that contained an anion of 2-oxyiminopropionic acid. The compounds was studied by IR spectroscopy and magnetochemistry as well as by x-ray structural analysis, which indicated that the flat four-coordination complex anions have a cis structure, with each ligand being bonded with copper through an N-oxime group and one of the carboxyl O atoms. Figure 1; References 10: 4 Russian, 6 Western.

UDC 546.93:546.131

Polynuclear Iridium (III) Chlorides

18410213E Moscow ZHURNAL
NEORGANICHESKOY KHIMII in Russian
Vol 34 No 4, Apr 89 (Manuscript received 11 Dec 87)
pp 909-915

[Article by A. B. Venediktov and R. G. Kultyshev, Institute of Inorganic Chemistry, Siberian Division, USSR Academy of Sciences, Novosibirsk]

[Abstract] A study is presented of the chemical nature of water-soluble iridium (III) chloride synthesized from sodium hexachloroiridate that is in turn obtained by chlorination of a mixture of metallic iridium and NaCl. Treatment of the solid sodium hexachloroiridate with hydrochloric acid yields concentrated hexachloroiridic acid, from which solid substances of the general formula $(H_3O)_{(x-3)} IrCl_x \cdot yH_2O$ are produced. The physical and chemical properties of these compounds are studied, and the results confirm the assumption stated in a previous work that the complex acids of the composition $H_3[MeCl_6]$, where $Me = Rh, Ir$, and (apparently) Ru , can be converted to nonstoichiometric water-soluble chlorides of the corresponding metal. Although under certain conditions they depolymerize to form a hexaacidofrom, the kinetic nature of these processes results in a significant deviation in the behavior of such systems from those of monomer compounds. Figures 3; references 20: 8 Russian, 12 Western.

UDC 546.96.226

Sulfate Complexes of Ruthenium With Ruthenium-Ruthenium Bond

18410213F Moscow ZHURNAL
NEORGANICHESKOY KHIMII in Russian
Vol 34 No 4, Apr 89 (Manuscript received 10 Jun 88)
pp 948-952

[Article by A. N. Zhilyayev, T. A. Fomina, I. V. Kuzmenko, A. V. Rotov, I. B. Baran, and O. V. Skiy, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences]

[Abstract] Binuclear complexes with four bridge sulfate groups and a metal-metal bond have been previously obtained for certain transition metals. This work studies the possibility of producing similar complexes of ruthenium. The reaction of $[Ru_2(O_2CCH_3)_4(H_2O)_2]_2SO_4$ with sulfuric acid in the presence of M_2SO_4 , where M is K^+ , Cs^+ , leads to the production of $M_3[Ru_2(SO_4)_4(H_2O)_2] \cdot 2H_2O$. X-ray structural studies indicate the presence of the Ru-Ru bond at 2.303(1) Å and four bridge sulfate groups. The ruthenium sulfate hydrate group can undergo single electron oxidation, which was separated as the potassium and cesium salts. Figure 1; references 10: 5 Russian, 5 Western.

UDC 541.123.2

The Systems Tb_2S_3 - Bi_2S_3 , Gd_2S_3 - Bi_2S_3

18410213G Moscow ZHURNAL

NEORGANICHESKOY KHIMII in Russian

Vol 34 No 4, Apr 89 (Manuscript received 18 Apr 88)

pp 992-96

[Article by Ye. I. Ardashnikova, M. P. Borzenkova, and
N. V. Borovskikh, Moscow State University imeni M. V.
Lomonosov]

[Abstract] A study is made of the systems Tb_2S_3 - Bi_2S_3 and Gd_2S_3 - Bi_2S_3 . The rare earth elements were selected because computations indicate that areas of continuous solid solutions at high temperatures might be found in these systems. Differential thermal analysis and x-ray phase analysis plus the method of isothermal annealing are used to construct the phase diagrams of the systems, which are found to be similar to each other as well as the system Dy_2S_3 - Bi_2S_3 . Areas of stibnite-like solid solutions are found as expected. A gradual change in the coordination of the metal is observed with variation in concentration of the rare earth element and bismuth. Figures 2; references 8: 6 Russian, 2 Western.

UDC 546.24.07

Bis-Imines of Bis-(2-Formylphenyl)telluride. Proof of Existence of Intramolecular Te-N Coordination Bonds in Solution and in Solid State

18410171a Moscow METALLOORGANICHESKAYA
KHIMIYA in Russian Vol 2 No 2, Jan-Mar 89
(manuscript received 9 Feb 88) pp 298-305

[Article by I. D. Sadekov, A. A. Maksimenko, A. G. Maslakov, G. K. Mekhrotra, G. S. Borodkin, O. Ye. Kompan, Yu. T. Struchkov, M. A. Fedotov, and V. I. Minkin, Scientific Research Institute of Physical and Organic Chemistry, Rostov State University]

[Abstract] Bis-Imines of bis-2-formylphenyl telluride were studied in solutions and in the solid state. Because of two monodentant ligands present in such compounds, mono- or dicoordinated Te-N bonds could exist in principle, relating to 10-Te-3 or 12-Te-4 telluranes, respectively. On the basis of experimental data it was concluded that only one axial Te-N bond (2.702 Å over A) exists in the solid state. In solution, a rapid transco-ordination occurs, that involves the formation and breaking of Te-N bonds, as manifested in ^{125}Te NMR spectrum by a triplet signal. Determination of the dipole moments indicated that in solution also only one coordination bond of Te-N could exist. Figure 1; references 24: 8 Russian, 16 Western.

UDC 347.345 + 547.254.1

Reaction of Dialkyl Compounds of Alkaline Earth Metals With Vinyltrimethylsilylacetylene

18410171b Moscow METALLOORGANICHESKAYA
KHIMIYA in Russian Vol 2 No 2, Jan-Mar 89
(manuscript received 1 Mar 88) pp 314-316

[Article by V. N. Cherkasov and L. N. Cherkasov, Bryansk Technological Institute]

[Abstract] In continuation of their studies of alkaline earth metal reactions, the authors showed that diethyl calcium, strontium, and barium added to vinyltrimethylsilylacetylene at a 1:1 ratio form metalloorganic adducts. Demethylation of these intermediate products with water yielded mixtures of silicon acetylene and silicon allene hydrocarbons of normal structure. No isoalkenes or isoalkynes were obtained, which indicated that the metalloorganic radical is added to the terminal carbon atom. Thus, these reagents behave like lithium organic compounds and not like the dialkylmagnesium compounds. References 11: 10 Russian, 1 Western (by a Russian author).

UDC 542.97:547.49:547.1'118:546.98

Synthesis of Iodinated Polynuclear Palladium Compounds and Rapid Reverse Coordination of Carbonyl Ligand on Tetranuclear Center

18410171c Moscow METALLOORGANICHESKAYA
KHIMIYA in Russian Vol 2 No 2, Jan-Mar 89
(manuscript received 5 Mar 88) pp 317-322

[Article by Ye. G. Mednikov, Coal Institute, Siberian Division, USSR Academy of Sciences, Kemerovo]

[Abstract] In contrast to existing carbonylphosphene halide complexes of palladium, there are practically no known compounds without the bridge function of a phosphorus-containing ligand. The novel iodine-containing clusters $\text{Pd}_4(\text{CO})_3(\text{PPh}_3)_4 \text{I}_2$ and $\text{Pd}_4(\text{CO})_2(\text{PPh}_3)_4 \text{I}_2$ were synthesized by reacting $\text{Pd}_{10}(\text{CO})_{12}(\text{PPh}_3)_6$ with $(\text{PPh}_3)_2\text{PdI}_2$ or by direct iodination of $\text{Pd}_4(\text{CO})_5(\text{PPh}_3)_{\text{reset}}_4$. Iodination of $\text{Pd}_{10}(\text{CO})_{12}(\text{PPh}_3)_6$ and reaction of $\text{Pd}_4(\text{CO})_5(\text{PPh}_3)_4$ with HgI_2 yielded the hexacluster $\text{Pd}_6(\text{CO})_4(\text{PPh}_3)_4 \text{I}_2$ and a bimolecular complex $\text{Pd}_2(\text{CO})(\text{PPh}_3)_3 \text{I}_2$. In contrast to other reactions, $\text{Pd}_4(\text{CO})_5(\text{PPh}_3)_4$ and $\text{Pd}_3(\text{CO})_3(\text{PPh}_3)_4$ gave different products upon reacting with HgI_2 , namely, $\text{Pd}_2(\text{CO})(\text{PPh}_3)_3 \text{I}_2$ and $(\text{PPh}_3)_2\text{PdI}_2$. References 14: 6 Russian, 8 Western (2 by Russian authors).

UDC 541.571.5

Polynuclear Mo(VI)-Mo(V) Complex—Precursor of Molecular Nitrogen Reduction Catalyst

18410171d Moscow METALLOORGANICHESKAYA
KHIMIYA in Russian Vol 2 No 2, Jan-Mar 89
(manuscript received 19 Apr 88) pp 331-333

[Article by M. Yu. Antipin, Yu. T. Struchkov, A. K. Shilova, L. M. Kachadina, L. P. Didenko, and A. Ye. Shilov, Institute of Elemental Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow; Division of Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka]

[Abstract] A crystalline complex was isolated from a methanol solution containing MoCl_5 (with about 30 percent Mo(VI)), NaOH, and MgCl_2 . X-ray structural analysis showed that this complex corresponds to the formula $[\text{Mg}_2\text{Mo}_8\text{O}_{22}(\text{MeO})_6(\text{MeOH})_4]^{2-} \cdot [\text{Mg}(\text{MeOH})_6]^{2+} \cdot 6 \text{ MeOH}$ (I underlined). Electrochemical reduction of this complex yielded an Mo(III) derivative, that is an active catalyst of the reduction of N_2 at room temperature and at atmospheric pressure. The structure of I (underlined) was shown to be a mixed Mo(V) and Mo(VI) molybdenum-magnesium oxide cluster. Figure 1; references 7: 1 Russian, 6 Western (1 by Russian authors).

UDC 535.379 547.1'13

Free Radical Mechanism of Chemoluminescent Reaction of $(C_2H_5)_2AlC_2H_5$ With XeF_5 in Solution*18410171e Moscow METALLOORGANICHESKAYA KHIMIYA in Russian Vol 2 No 2, Jan-Mar 89 (manuscript received 30 Mar 88) pp 339-344*

[Article by R. G. Bulgakov, V. N. Yakovlev, R. A. Sadykov, G. Ya. Maystrenko, V. P. Kazakov, and G. A. Tolstikov, Institute of Chemistry, Bashkir Scientific Research Center, Ural Division, USSR Academy of Sciences, Ufa]

[Abstract] The goal of this work was to study the mechanism of the formation of products in basic and electron-excited states during the oxidation of alkyl organoaluminum compounds with XeF_2 by using $(C_2H_5O)_2AlC_2H_5$ with only one unoxidized Al-C bond as a model compound. Without a solvent, this reaction was highly exothermic, which led to an explosion of the reagents. Analysis of all reaction products obtained in toluene indicated a highly complex process in which the main reaction was an attack on the Al-C bond by the XeF_2 , which yielded $(C_2H_5O)_2AlF$. The quantitative reaction course indicated a free radical mechanism of this reaction. The C_2H_5 radicals generated reacted with XeF_2 and yielded stable C_2H_5F and an excited emitter of chemoaluminescence XeF^* . With toluene, C_2H_5 formed a number of derivatives by its reactions with both the aromatic ring and the side chain and yielded ethoxy and F-substituted toluenes. Figures 3; references 15: 11 Russian (1 by Western authors), 4 Western (1 by Russian authors).

UDC 542.97:547.49:547.539

Reactions of Metalloorganic Compounds Catalyzed by Transition Metal Complexes. Synthesis of Heterocyclic Ketones From Organomercuric Compounds and Carboxylic Acid Chlorides in Presence of Palladium Complexes*18410171f Moscow METALLOORGANICHESKAYA KHIMIYA in Russian Vol 2 No 2, Jan-Mar 89 (manuscript received 3 May 88) pp 351-355*

[Article by N. A. Bumagin, P. G. More, and I. P. Beletskaya, Moscow State University imeni M. V. Lomonosov]

[Text] The reaction of R_2Hg (or $RHgX$) with $R'COCl$ catalyzed with palladium complexes in the presence of iodide ion was used to synthesize heterocyclic ketones. In this process the heterocycle could be a fragment of the organomercuric compound or of the carboxylic acid chloride. Various factors, reagent ratios, and reaction conditions were analyzed as they affected the yield. Optimally, a combination of reagents was determined in which acyl halide showed the highest reactivity at the stage of oxidative addition. The iodide ion played several roles in this process: it activated the acyl chlorides

used, it polarized the hydrocarbon-mercury bond and increased its nucleophilicity, it formed anion complexes with palladium, and it also possibly helped slow down the demercurization process. References 18: 5 Russian, 13 Western (1 by Russian author).

UDC 542.957.1

Optically Active Planar-Chiral 2-Substituted Ferrocenylmethyl Carbocations Organopalladium Route*18410171g Moscow METALLOORGANICHESKAYA KHIMIYA in Russian Vol 2 No 2, Jan-Mar 89 (manuscript received 5 May 88) pp 356-362*

[Article by V. I. Sokolov, L. L. Troitskaya, L. A. Bulygina, and P. V. Petrovskiy, Institute of Elemental Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow]

[Abstract] A series of optically active planar-chiral 2-substituted ferrocenylmethyl ions was obtained by asymmetric cyclopalladiation. The compounds preceding the formation of these ions were obtained through chelated palladium metallocycles, as reported in previous paper. Among these compounds, dications were obtained with positive charges at the carbon atom and at the quaternary ammonium nitrogen. The circular dichroism and NMR spectra of these ions were discussed. Figures 2; references 18: 6 Russian, 12 Western (3 by Russian authors).

UDC 541.49:542.91

Carbonylation of Aromatic Halides in $Co_2(CO)_8$ -Alkyl Halide-Base System*18410171h Moscow METALLOORGANICHESKAYA KHIMIYA in Russian Vol 2 No 2, Jan-Mar 89 (manuscript received 29 May 88) pp 385-387*

[Article by T. Ye. Zhesko, V. P. Boyarskiy, and I. P. Beletskaya, All-Union Petrochemistry Scientific Research Institute, Lenneftekhim Scientific Production Organization, Leningrad; Moscow State University imeni M. V. Lomonosov]

[Abstract] Carbonylation of aromatic halides catalyzed by transition metal complexes represents an important route for the preparation of aromatic acids. This reaction was studied by using α -chloronaphthalene and bromobenzene in the system $Co_2(CO)_8$ -RX- K_2CO_3 - CH_3OH . The activity of the catalytic system as a function of the alkyl halide used could be ordered in the following series: $PhCH_2Cl > CH_3I-C_2H_5I > C_2H_5Br-C_8H_{17}Br > ClCH_2COOCH_3$. The reaction rate was not affected by the type or concentration of the base used. Also, the acyl complexes obtained from acyl chloride showed no catalytic effect on the carbonylation of acyl halides. Figure 1; references 6: 2 Russian, 4 Western.

UDC 547.254.6

**Synthesis of Vanadium
Monocyclopentadienyloxodichloride**

18410171j Moscow METALLOORGANICHESKAYA
KHIMIYA in Russian Vol 2 No 2, Jan-Mar 89
(manuscript received 1 Nov 88) p 474

[Article by G. K.-I Magomedov, K. M. Kusainova, and I. P. Beletskaya, State Scientific Research Institute of Chemistry and Technology of Elemental Organic Compounds, Moscow]

[Abstract] A simple synthesis of monocyclopentadienyloxodichloride was reported. It was based on the reaction of vanadium trichloroxide with cyclopentadienyl thalium in toluene at 20°C. The yield of the final product was 70 percent. References 4: 2 Russian, 2 Western.

539.193;543.51;547.1'128

**Electronic and Dynamic Structures of
Organosilicon Ions in Gas Phase**

18410171i Moscow METALLOORGANICHESKAYA
KHIMIYA in Russian Vol 2 No 2, Jan-Mar 89
(manuscript received 26 May 88) pp 419-421

[Article by I. A. Abronin, L. N. Shchegoleva, T. F. Slyusarenko, and V. N. Bochkapev, State Scientific

Research Institute of Chemistry and Technology of Elemental Organic Compounds, Moscow]

[Abstract] A series of anomalies was noted in RSiCl_3 mass spectra (where $\text{P} = \text{C}_2\text{H}_5, \text{C}_3\text{H}_7$ or C_4H_9). The input of the Cl_3Si^+ ion decreases in the series $\text{C}_2\text{H}_5 = \text{C}_4\text{H}_9 > \text{C}_3\text{H}_7$, even though a gradual increase was expected when going from C_2H_5 to C_4H_9 . The goal of this work was to calculate the structure of the $(\text{C}_2\text{H}_4\text{SiCl}_2)^+$ cation by using the nonempirical quantum chemical approach SSP MO LKAO on the basis of 3-21GF in the formalism of an unlimited method with optimization of geometric parameters by the Gaussian 80 program adapted to the Yes-1061 computer. For such systems, the most stable structure is a skewed triangular structure with C_3 -symmetry whose stabilization is determined by the Jan-Teller pseudoeffect resulting from the interaction of the basic and the excited states of the cation radicals on account of nuclear displacements. Figure 1; references 8: 3 Russian, 5 Western (1 by Russian authors).

UDC 547.26'118

Reaction of Trivalent Phosphorus Acid Thioesters With Dichloroacetylene

18410191A Leningrad ZHURNAL OBSHCHEY
 KHIMII in Russian Vol 59 No 3, Mar 89 (Manuscript
 received 30 Oct 86) pp 512-516

[Article by O. G. Sinyashin, V. A. Zubanov, R. Z. Musin, E. S. Batyyeva, and A. N. Pudovik, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Affiliate, USSR Academy of Sciences]

[Abstract] Diethyldithiophosphorus acid chloride was reacted with chloroethynyl ethylsulfide to yield a multi-component reaction mixture containing small quantities of a product with δP 94 ppm. All attempts to isolate this product were unsuccessful. Possible reaction mechanisms are discussed. The experimental material presently available does not allow preference to be given for any of the suggested reactions of P(III) acid thioesters with dichloroacetylene. References 10: 8 Russian, 2 Western.

UDC 547.26'118+547.241

Reaction of Trivalent Phosphorus Acid Chlorides With Azomethines

18410191C Leningrad ZHURNAL OBSHCHEY
 KHIMII in Russian Vol 59 No 3, Mar 89 (Manuscript
 received 20 Jul 87) pp 520-523

[Article by P. I. Gryaznov, A. N. Tudovik, K. M. Yenikeev, and A. M. Kibardin, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Affiliate, USSR Academy of Sciences]

[Abstract] The reaction of N-butyisobutyroimine with ethyl and isopropyl dichlorophosphites forms trivalent phosphorous acid chlorides by imine-enamine regrouping, yielding enamines that interact with phosphorous acid chloride. Azomethines not capable of imine-enamine tautomerism react with chlorophosphites to form 1,4,2-diazaphospholanes. References 5: Russian.

UDC 547.241+547.422

Synthesis of 2-Oxy-2-Alkyldiethyldiphenylphosphines

18410191D Leningrad ZHURNAL OBSHCHEY
 KHIMII in Russian Vol 59 No 3, Mar 89 (Manuscript
 received 14 Jul 87) pp 523-28

[Article by Yu. G. Shermolovich, A. V. Solovyev, N. P. Kolesnik, and L. N. Markovskiy, Institute of Organic Chemistry, Ukrainian Academy of Sciences, Kiev]

[Abstract] In order to synthesize compounds with a diphosphabicyclo[3.3.3]-undecane structure, the authors developed a method to produce their precursors—2-oxyethylphosphines. This article studies the reaction of diphenylphosphine and its derivatives with olefin

oxides containing substituents with varying electron-acceptor properties and volumes in the epoxy ring. 1,2-Epoxyalkanes with substituents in the epoxy ring having various electron and space properties react with diphenyl(trimethylsilyl)phosphine or lithium diphenylphosphide to form 2-oxy-2-alkylethylphenylphosphines. References 10: 5 Russian, 5 Western.

UDC 547.241+547.412.92

Reaction of Tris(perfluoralkyl)phosphinioxides and Tris(perfluoralkyl)difluorophosphoranes With Fluoride Ion

18410191E Leningrad ZHURNAL OBSHCHEY
 KHIMII in Russian Vol 59 No 3, Mar 89 (Manuscript
 received 27 Jul 87) pp 528-34

[Article by N. V. Pavlenko and L. M. Yagupolskiy, Institute of Organic Chemistry, Ukrainian Academy of Sciences, Kiev]

[Abstract] A study is made of the reaction of the organophosphorus compounds mentioned in the title with the fluoride ion. It was found that cesium fluoride attaches to tris(perfluoralkyl)phosphine oxides in ether to form stable adducts with pentacoordination phosphorus atoms. Tris (perfluoralkyl)difluorophosphoranes, reacted with CsF, KF, and NaF, form tris(perfluoralkyl)trifluorophosphates of the corresponding metals. Diazonium salts with tris(perfluoralkyl)phosphate anions when heated are easily converted to fluorobenzene derivatives with quantitative regeneration of the initial tris(perfluoralkyl)difluorophosphoranes. References 8: 2 Russian, 6 Western.

UDC 547.241+547.26'11+547.412.92

Bis(perfluoralkyl)phosphinic Acid Esters

18410191F Leningrad ZHURNAL OBSHCHEY
 KHIMII in Russian Vol 59 No 3 (Manuscript received
 27 Jul 87) pp 534-537

[Article by N. V. Pavlenko, V. N. Zavatskiy, V. Ya. Semeni, G. I. Matyushecheva, and L. M. Yagupolskiy, Institute of Organic Chemistry, Ukrainian Academy of Sciences, Kiev]

[Abstract] There is no information in the literature on the synthesis of bis(perfluoralkyl)phosphinic acid esters with perfluoralkyl radicals other than the trifluoromethyl group. This article discusses general methods of producing the esters and studying some of their properties. The esters were obtained by reaction of a silver salt of bis(heptafluoropropyl)phosphinic acid with alkyl iodides and by alcoholysis of bis(perfluoralkyl)phosphinic acid chlorides. The methyl ester of bis(heptafluoropropyl)phosphinic acid is found to be a very effective methylating agent. References 4: 1 Russian, 3 Western.

UDC 546.18+547.36

Esters of N-Substituted -aminoethylphosphonic Acid

18410191H Leningrad ZHURNAL OBSHCHEY
KHIMII in Russian Vol 59 No 89 (Manuscript received
19 Dec 86) pp 556-64

[Article by Ye. S. Gubnitskaya, L. P. Peresyphkina, Institute of Organic Chemistry, Ukrainian Academy of Sciences, Kiev]

[Abstract] Continuing studies on derivatives of β -aminoethylphosphonic acid, the authors discuss the synthesis and properties of esters of N-substituted β -aminoethylphosphonic acid. Diesters of N-silylated β -aminoethylphosphonic acid were produced for the first time by the Michaelis-Becker reaction from silylated amines and amides. C-substituted vinylphosphonates with amines yield salts of vinylphosphonic acid with these amines. When β -bromomethylphosphonic acid chloride is reacted with amines, vinylphosphonic acid esteramides are produced. The esters of β -aminoethylphosphonic acid esters are easily reacted with dialkylphosphites and heterocumulenes—isocyanate and N-oxides—to form the corresponding ureas and amidooximes. References 13: 10 Russian, 3 western.

UDC 546.18+547.36

Interaction of Triethylphosphite With -Functionally Substituted Acetylene Compounds

18410191H Leningrad ZHURNAL OBSHCHEY
KHIMII in Russian Vol 59 No 3, Mar 89 (Manuscript received 19 Dec 86) pp 564-67

[Article by T. D. Abramyan, A. M. Torgomyan, G. A. Panosyan, M. Zh. Ovakiyan, and M. G. Indzhikyan, Institute of Organic Chemistry, Armenian Academy of Sciences, Yerevan]

[Abstract] Trimethylpropargylammonium and triphenylpropargylphosphonium bromides were used to study the influence of the properties of β substituents on the reaction of acetylene compounds with triethylphosphite. The acetylene compounds containing hydroxyl, acetate, and ammonium substituents in the β position form bisphosphonates when heated with triethylphosphite. The bisphosphonates formed result either from initial reesterification or anomalous nucleophilic substitution with subsequent regrouping. Triphenylpropargylphosphonium salt with triethylphosphite forms a product of attachment at the acetylene group. References 3: Russian.

UDC 547.26'118

Acylation of 2-Hydro-2-oxo-4,5-dimethyl-1,3,2-dioxaphospholane by Trifluoroacetic Anhydride

18410191J Leningrad ZHURNAL OBSHCHEY
KHIMII in Russian Vol 59 No 3, Mar 89 (Manuscript received 5 Feb 88) pp 713-714

[Article by V. F. Mironov, Ye. N. Ofitserov, I. V. Konovalova, and A. N. Tudovik, Kazan State University imeni V. I. Ulyanov-Lenin]

[Abstract] The reaction of phosphorus acids with carboxylic acid anhydride forms ketophosphonates and products of their subsequent transformation—diphosphonocarbonols and phosphorylated phosphates. In contrast to acyclic dialkylphosphites, 2-hydro-2-oxo-4,5-dimethyl-1,3,2-dioxaphospholane, when reacted with trifluoroacetic anhydride in the presence of pyridine, forms trifluoroacylphosphite with a yield of 60 percent, the first known case of acylation of dialkylphosphites leading to compounds with the $P^{III}-OC(O)CF_3$ with a preparative yield. References 3: Russian.

UDC 547.753.241

Phosphorylation of 1,3,3-Trimethyl-2-methyleneindolene

18410191K Leningrad ZHURNAL OBSHCHEY
KHIMII in Russian Vol 59 No 3, Mar 89 (Manuscript received 2 Mar 88) pp 719-20

[Article by A. A. Tolmachev, A. N. Kostyuk, and E. S. Kozlov, Institute of Organic Chemistry, Ukrainian Academy of Sciences, Kiev]

[Abstract] Earlier works have shown that indolene interacts with phosphorus trichloride or tribromide in a ratio of 2:1 in the presence of triethylamine to form halogen phosphines. The authors found that phosphorus trichloride or phosphorus oxychloride when reacted with indolene in a ratio of 1:1 in the presence of triethylamine yields phosphorylated indolenes, the PMR spectra of which indicate that it is primarily the E-isomer that is formed. The phosphorylated indolenes formed are fully stable, easily crystallized substances. References 4: 2 Russian, 2 Western.

UDC 547.458.81

Analysis of Structure Formation in Cellulose Materials Upon Combined Drying

18410204A Riga KHIMIYA DREVESINY in Russian
No 2, Mar-Apr 89 (Manuscript received 11 Oct 88)
pp 6-7

[Article by Yu. B. Grunin, Mary Polytechnic Institute]

[Abstract] A study is made of the influence of combined drying conditions on changes in certain properties of sulfate cellulose. Specimens were dried in an installation combining dielectric drying with conductive and contact drying. Changes in the supermolecular structural parameters of the specimens were monitored by pulsed NMR spectroscopy. More intensive moisture removal occurs as a result of the fact that the total flow of moisture depends not only on the moisture content gradient, pressure, and temperature but also on electrical diffusion. Dielectric drying removes water significantly more rapidly than does contact drying; it decreases internal stresses and yields a more compact and homogeneous sheet. References 3: Russian.

UDC 676.16.026.5.011

**Change in Cellulose Fiber Structure During
Nonisothermal Drying**

18410204B Riga *KHIMIYA DREVESINY* in Russian
No 2, Mar-Apr 89 (Manuscript received 25 Dec 87; after
revision 21 Apr 88) pp 18-20

[Article by N. A. Zhuravleva, G. K. Malinovskaya, I. I.
Yeremeyeva, V. M. Drobosyuk, and V. M. Gropyanov,
Leningrad Technological Institute of the Cellulose and
Paper Industry]

[Abstract] The structural characteristics of fibers determining the paper-forming capacity of the cellulose intermediate product were studied, particularly the total surface area and porosity as well as changes in mean fiber diameter, during nonisothermal drying. The total surface area of the cellulose specimens was measured by low-temperature argon sorption, and pore volumes and radii were determined by high- and low-pressure mercury porometry. Specimens dried at not over 40°C retain the greatest pore volumes; at 100°C, microporosity increases slightly in comparison to specimens dried at 80°C, thus indicating a low-temperature area in which the structure of the cellulose fibers changes sharply. Increasing the temperature from 40 to 60°C at 1.5°C/min causes compacting of the fibers' inner surfaces due to formation of bonds among the fibers. Figures 5; References 2; Russian. y

Railcar Shortage Hurts Refinery Production

18290130 Moscow GUDOK in Russian 11,
12 Mar 89 p 2

[Article by GUDOK special correspondent N. Tsurikov, Moscow—Ufa—Kuybyshev, under the rubric "Problems and Opinion": "A Bitter Aftertaste"]

[11 Mar 89 p 2]

[Text] *The petroleum-refining enterprises are calling for help: give us railcars, we are stopping production! At the same time some 30,000-40,000 tank cars are standing immobilized.*

Mark Twain said one time, "Everyone complains about the weather, but no one does anything about it." The impression is being created that the problem of freight residue in railcars, and especially in tank cars, is of the same order. Everyone I had occasion to speak with began the conversation pretty much like this: "It is a problem as old as the world, and the situation is not only not getting better, it has even gotten worse." By the way, a typical feature: the driver of the vehicle I had to take to the Bashkir Division, where the residue in the cars has created perhaps the most acute situation in the system, spoke on this topic like a specialist, and I involuntarily asked him, "Did you work for the railroad?"

"No," he answered, "I've been at the wheel my whole life. I just hear conversations about it, I can't remember now how many times. Lots of different managers have been here, and I involuntarily hear their discussions. They were investigating not long ago from the all-union committee of people's control. I don't know if anything will change..."

A Hundred Trains "Out of Generosity"

Yes, the situation has now become so bad that they have had to be occupied with it at the very highest levels. A prosperity of tank cars does not ensure the dispatch of the liquid freight. It is namely freight residue in the railcars that has very greatly aggravated the situation. The quantity of it in tanks considered empty is ever increasing. Today it is roughly 300,000 tons a year, or one and a half times more, say, than in 1983, when ministerial order No 10Ts, "Steps to Improve the Organization and Ensure the Fulfillment of Plan Targets for Shipping Liquid Freight," still in effect and well known to specialists, was promulgated. The recipients, in other words, do not empty no more or less than 100 trains of 3,000 tons apiece a year!

That is not the whole problem, however. If, say, it is no great labor to free a tank car of liquid fuel oil or gasoline, it is very difficult for with the residue of chemical freight. When it is still known what sort of product it is, the question can be solved. But after all, a multitude of tank cars arrive without forwarding documents or corrected bills of lading and without stencils, and it is impossible to establish what sort of freight it is or who the recipient or the sender were. And there are more than a couple of

such cars. There are 15,000 for petrochemical and food products alone, which cannot be used without their being neutralized and cleaned. Add here thousands of car tanks for asphalt or tar, also "frozen" with large amounts of residue or idle awaiting unloading at recipients who do not have equipment for heating and unloading such freight, and it becomes clear how much rolling stock is constantly not being utilized. They provided this information at the railcar main administration: "Today there are about 30,000-40,000 'excess' tank cars in the system that for various reasons—due to large amounts of residue, excessive idle time etc.—are as if removed from circulation." And removing the shortcomings would reinforce the fleet with additional working tank capacity.

But after all, they have made no few fine decisions, while the situation just gets worse. What is going on? And in general, why so much residue?

The Shield That Does not Shield

I had occasion to discuss this with many specialists. And to summarize their opinions, everything is reduced to the following in general: there is no well-defined specialization of the rolling stock; the railroad workers are insufficiently demanding of the freight recipients, and they, enjoying an absence of monitoring, return dirty and uncleaned tank cars to the lines; the transport workers themselves are undisciplined, using petroleum and gasoline tanks not intended for it for loading chemical products, sending empties according to altered forwarding bills of lading or without them, without indications of the type of freight, unloading stations or the shipper...

But is all this really news? Take that same order No 10Ts or last year's ministerial directive No 245 of February 3. Both prescribe in the strictest fashion "take steps," "instill order," "strengthen," "obligate," "categorically forbid..." The order also talks about the specialization of rolling stock and the incorporation of a road-network system for monitoring and analyzing the loading and unloading of liquid products as early as 1985. Realize all of this and monitoring would be sharply improved and the demands on the violators of the prevailing requirements would be more concrete. But alas...

The issue of "putting to work and utilizing the unproductively idle unregistered tank cars for the discharge of chemical freights on the Kuybyshev Railroad" was also raised in that order. Are there any changes? They had to consider this issue once more in January of this year at the level of the leadership of the USSR Council of Ministers, because on the Bashkir Division alone about three thousand uncleaned tanks had accumulated, there was nothing to fill up and they had to stop production at some petroleum refineries—that is what it has come to!

And it seems that the problem of freight residue in tank cars (and in rolling stock in general as well) remains alive largely because, in trying to "surmount" it, they are acting inconsistently, they are not deeply analyzing the reasons for the slippage. In reading the documents that

have been adopted on this issue at various times, you simply get tired of the repetition of clauses distinguished just by the substitution of certain words for others, evidently seeming to the composers of the papers more severe and thus more effective. But even with every desire to follow strictly the prescriptions, you will hardly achieve much if the right hand does not know what the left is doing. And no few examples of such actions could be cited.

Requiring of freight recipients, for example, the complete emptying of tank cars, the railroad workers have established norms for railcar idle time into which everything does not fit. It is natural that in order to avoid fines, they dispatch the cars without empty tanks. It is amazing that sometimes up to half and more of the product is not unloaded! But look at what happens. The railroad workers can and are even obligated to return non-emptied tank cars to the enterprise. They are just punishing themselves, after all: tank car idle time grows, and that means the station indicators get worse. And this mechanism, causing an imbalance of interests, is still in operation today. The lesser of two evils is selected, as is well known, and this is one answer as to why the railroad workers are "easy" on the clients in mass fashion.

Inveighing for clean tank cars, they ship asphalt and tar in conventional ones, even without steam jackets. Yes, there are not enough special hopper cars for this freight. But once need forces them, they must monitor more precisely where the tank cars are dispatched—after all, not all the recipients, as has already been noted, have the equipment for heating and unloading such products. The railroad workers themselves, on the other hand, have insufficient capacity for cleaning tank cars. The technology of washing and steam-cleaning stations [PPS—]moreover does not envisage this cleaning. And the capabilities of the primitive workstations built using in-house resources, which still do not exist everywhere, are too little. About 80 tank cars are prepared per day, say, in the Bashkir Division, but way more arrive with asphalt and tar residue.

Or this: they complain about the poor monitoring of the completeness of tank emptying at the same time as they have cut back on many freight receivers. ("The stations have been stripped bare," the clients are even complaining!) And the railroad workers justify themselves by saying that they are not obligated under the charter with implementing 100-percent monitoring, they just have the right to inspect. The chief of the MPS [Ministry of Railways] Main Administration for Container Shipping and Commercial Operations, V. Logunov, stated it thus: "The receivers do have reason to complain. Even if we double the staffing, we could not monitor all of the loading on today's scale. The freight recipients are obliged to fulfill the Charter—that is the main thing."

And there is monitoring and there is monitoring, anyway: after all, you could keep a single receiver on the system overall and also consider there to be monitoring. But such a shrunken detachment of inspectors has not

been a very reliable shield to dirty and uncleaned rolling stock—that is a fact. Whereas before 1985 the increase in freight residue had totaled roughly 4,000-6,000 tons a year, starting in 1985 it had reached thirty or forty thousand tons.

In the Bashkir Division, since the end of last year they have begun to assemble additional staff workers at the expense of local income whose direct task is to inspect the incoming empty cars and impose fines on the senders, and minimum targets for income have even been set for them—600 rubles a month apiece. That is, here they have decided to approach the problem from the other end: since the freight recipients on the railroads whence the empties are coming are poorly monitored, they take them into circulation themselves. And, I feel, are displaying an example of thrifty economy in this matter.

On the Shoals of Interests

The washing and steam-cleaning of tank cars is a losing enterprise for the railroad workers, and if the residue increases, the expenses are greater. To weaken monitoring thus means, it could be said, to get yourself into a worse fix. But after all, the expenses from cleaning tank cars are still not all. The idle rolling stock with residue is also a heavy financial burden and additional depreciation expenses. Last year these expenses totaled 30 million rubles on the Bashkir Division alone. And what expenses there must be across the system and across the country overall due to the freezing of assets and the untimely delivery of product!

A series of fundamental decisions on this issue was recently made. It was planned to transfer a portion of the tank cars from the MPS fleet to the ownership of the enterprises so that starting April 1 of this year, all chemical and food products would be shipped only in rolling stock belonging to its own shippers. Targets were given to industry for cleaning idle tank capacity with chemical and food freight residue. Concrete tasks were set here for tank-car specialization, improvements in monitoring the state and utilization of them and the employment of ASU [automated control systems], which should issue the essential information as early as the second half of this year.

These steps are undoubtedly well-founded and make it possible to hope that the situation will finally change for the better. But the economic mechanism is still making itself felt weakly, and it is not even set up as it should be. Why, for example, is it more advantageous for the freight recipient to return up to half a tank car or more of product than to pay fines for overdue cars? On the other hand, what sort of norms are they that make it possible to bestow these burdensome "gifts" on the railroad workers?

And is it really just a matter of individual "economic shoals?"

And how many problems there are at the washing and steam-cleaning stations themselves where the rolling stock is freed of the leftover product. The ecological situation there is difficult as well.

But we will continue that discussion in the next installment.

[12 Mar 89 p 2]

[Text] Large amounts of residue in the railcars is more work for the steam cleaners, longer cleaning for the tanks, longer idle time and longer lines for processing. At the same time, the insufficient capacity and capabilities of the steam-cleaning stations themselves restrains the preparation of the rolling stock. Built decades ago, the stations essentially remained at the level of past years, when both the types of products shipped were less and the tank cars needed washing more rarely. They are poorly equipped.

The Yasnogorsk Machine Building Plant, the only one in the country supplying the pump equipment, by the way, only meets 60-70 percent of the railroad workers' needs. Innovators have made no few efforts to raise the level of mechanization and automation in the tank-car washing process, but they are not able to solve all the problems.

The steam cleaners have moreover annoyed environmental-protection bodies and the population lately, and some that residential buildings have moved close to are in danger of being closed altogether. There is so much lack of clarity on this issue, however, that there is a need to talk about it in more detail.

Who Gives Off More Fumes

Those attacking the steam cleaners feel that they are exceedingly harmful. "A minimum of 10 kilograms of product is blown out of each tank car in processing. And we have two such stations here in Ufa alone—Benzin and Chernikovka-Vostochnaya. They prepare hundreds of cars in a day, and that means that tons of substances, including harmful ones, are exuded. And that is cause to sound the alarm," says the chief of the air-protection department of the Bashkir Goskompriroda [State Committee for the Protection of Nature], A. Vinkelman, with conviction.

I heard the same at local health stations and at the Committee for People's Control of the BASSR [Bashkir ASSR]. But the railroad workers themselves do not agree with this. "There is very little harm: it is principally steam that goes into the air, and not pure product as at the petroleum refineries," they said at the local division. "And we do not discharge our waste water into the municipal system, we purify it for recycled use, and then, when it is highly polluted, we dump it at the cleaning facilities of the petroleum refineries. So just how can the steam cleaners be harming the environment here? In the area of the Benzin and Chernikovka-Vostochnaya stations, where they want to close our two PPSs, there is a

whole crowd of petrochemical enterprises that are basically poisoning the atmosphere. You can't move the plants away—at least it's not so simple to do that—so they get back at the PPSs."

I could not ascertain just who is right out there in Bashkiria. None of the disputants cited any clear or concrete data in confirmation of his arguments. That same A. Vinkelman complained about the difficulty of taking measurements. And after all, one must stop all the local enterprises to determine the harmfulness of the steam cleaning...

Only at the VNII [All-Union Scientific Research Institute] of Railroad Hygiene were they able to talk in concrete fashion about this issue.

"When I hear about attacks on the steam cleaners," said department chief Candidate of Medical Sciences I. Boyarchuk, "I want to lecture those people. They are dilettantes. No one disputes that they exude harmful substances, but the share of them is considerably below the allowable concentrations. Why push them? There is a psychological factor at work here. These stations are located close to petroleum refineries. They emit way more, their emissions have ten or more times higher content of harmful substances. But the refinery exhaust is colorless, and the steamers 'steam,' especially in the winter—it is visible far and wide.

"That is how people get the impression that all misfortunes are from these stations. We have taken a number of measurements. And even in the passages between the tank cars at the work stations, not to mention more remote points, we did not detect anything over the maximum allowable concentrations.

"In order to be more convincing," continued Ivan Fedorovich, "I'll say something else. According to the prevailing norms, the petroleum refineries can be built no closer than a kilometer from housing, while a PPS can be fifty meters away. We raised the issue of extending the refinery norms to the steam-cleaning stations, but have been unable to positively resolve it yet—the harmfulness is too small. By the way, we have analyzed the illness rates of the workers of steam-cleaning stations: they suffer principally from micro-climatic factors—drafts, overcooling or overheating—but not from toxic substances. There do occur, true, skin diseases from the dirt, there is still unfortunately plenty of that there."

I do not cite all of these statements in detail to defend the cleaning stations at all. Whatever you say, housing in close proximity to such enterprises is unpleasant, and where it can be done, it is of course desirable to remove the stations beyond the bounds of cities and towns. After all, for all that, "even though they are not as harmful as is felt, they're not flowers either," acknowledged I. Boyarchuk himself.

"Stepchildren" and "Uncles"

In the opinion of specialists, there is every opportunity today of reducing the harm from the steam-cleaning stations to a minimum. The scholars of VNIIZhT [All-Union Scientific Research Institute of Railroad Transportation], for example, have developed a steam-free technology that makes possible more than a one-and-a-half-fold reduction in undesirable emissions into the atmosphere when preparing "dark" tank cars and a 3-4-fold one with "light" cars. Power expenditures and water consumption are reduced, and conditions are created for conversion to a completely closed cycle. The time for processing the tank cars also decreases with this technology.

The advantages are obvious, but the railcar administration is not rushing to incorporate it, feeling it to be still too "raw."

"Why is it 'raw'?" objected an executive of the railroad-equipment cleaning group of VNIIZhT, Candidate of Technical Sciences I. Karavayev. "The new technology has been verified in practice, and it is easily 'inserted' into the existing process. It is another matter that it requires more powerful equipment and that additional funds are needed as well. And these issues are being resolved too slowly."

I. Boyarchuk also complained, "I've gone to see the head of the railcar administration, I. Khabe, dozens of times and proposed that we do a comprehensive study of cleaning issues in conjunction with VNIIZhT. Like it or not, life is forcing us to work in ecologically cleaner fashion. But this year we do not have a single topic in railcar facilities."

The steam-cleaning stations are among those facilities that, in the expression of one of my interlocutors, give no bother, and that's fine. And they treat them as stepchildren. "And is this our business?" was how my conversation started at the MPS Freight-Car Operations and Repair Department. "At one time," said the deputy chief of this department, N. Ryabov, and the lead specialist A. Grigoryev, "the freight services washed and cleaned the rolling stock, and the railcar people just repaired them. Then we got it all. Only here do we have such a distribution of duties—in other countries, those that use the tank cars have to wash them."

And the question recently sounded directly from the pages of GUDOK: "Are we having trouble taking on our own burden?" It would be simpler, they say, for the refineries to wash and steam the tank cars, "where they have incidental steam, where they could utilize and regenerate the product remaining in the tank cars."

But after all, a whole industry has now taken shape in this business, the railroad workers have the personnel and the experience. Is it that simple to convert and break it off? And is it necessary? Wouldn't it be better to think about how this business can be made profitable and how to extract it from poverty and stagnation? Today it is

unprofitable for the sector, there is just trouble and expense from it. So why, if the railroad workers are working "for uncle," preparing rolling stock for clients, do they bear all the weight of this burden? Why not on an equal footing with the clients, the more so as there is economic accountability [*khozrashchet*] and self-financing now, and nobody wants to pay for anything out of his own pocket? The steam-cleaning stations, as has already been said, are in such a state that they must be re-equipped, the technology has to be changed, they have to be made more productive and ecologically clean. And matters would go much quicker with a convergence of the efforts of the railroad and others sectors, which is in the interests of the clients themselves, who lose way more due to a shortage of tank cars and their poor preparation.

Today, when we have already passed along, as they say, the whole chain of problems with freight residue, it is clearly apparent that the basic cause of the misfortunes both there, before cleaning, that is, at the stage of tank car operation, and here, at the cleaning stations, is economic deficiencies, a lack of effective incentives. So many "organizational measures" have been taken, but matters are not being corrected. Thousands of tank cars with dead freight are sitting on the railroads right now: chemicals, foods, asphalt, tar... And can it really be only the force of government directives that can "revive" them somehow? So then, it will be that way in the future? But why does initiative slumber, why do they suffer the heavy burden of the frozen rolling stock in the local areas? The recent ministerial order "Shortcomings in the Work to Fulfill the Plan for Shipping on the Kuybyshev Railroad" records that "The target for the preparation of tank cars at the washing and steam-cleaning stations is 70 percent fulfilled, and for cleaning of residual chemical freight, 25 percent. Contracts for cleaning tank cars have not been concluded with the Kuybyshevazot [Kuybyshev Nitrogen] and Kuybyshevnfteorgsintez [Kuybyshev Petroleum Organic Synthesis] associations." And millions are being spent just for depreciation on the tanks not being used!

I ask the chief of the Bashkir Division, N. Protasov, and his deputy, B. Dyudyayev, "Is there even just one steaming station that has been converted to leasing, just one like that has appeared to force people to ask, to demand, 'Give us dirty cars!' instead of looking calmly at the lines of them, justifying it with 'objective difficulties'?" No, they did not provide a single example. The same as at the railcar administration, by the way, where I asked the same question.

At the Committee of People's Control of Bashkiria they told me about the enterprisingness of the workers of the local municipal services, who make a road surface from tar with the addition of 30 percent asphalt and other ingredients that enjoys great demand. Why not, it would seem, lend this experience to the railroad workers and create a cooperative ("sitting" on the residue!)?

"We can't," they declare. "We are obliged to surrender the petroleum residue to Goskomnefteprodukt [State Committee for the Supply of Petroleum Products]—they have a monopoly on the sale of it."

But the assertions go no further! Today those who want to achieve have posed the question of reviewing the state monopoly on foreign trade, and enterprises are getting direct access abroad. Can it really be that something can't be resolved here if these same railcar workers lay down their strong trump cards?

And that's how it is wherever you turn with this problem: here the economics have run up against organizational hurdles, a whole series of examples was cited in the previous installment when, on the contrary, the order-filled organizational procedure is pulled down by unbalanced economic interests.

It seems there is no sense in adding to what has been said. Because the main conclusion is already clear: without properly regulating the economic mechanism for the mutual relations of allied industries (the issue should perhaps even be a dedicated comprehensive "Residue" program), we will inevitably be paying a multi-million-ruble tribute for mismanagement and inertia. It really is like Mark Twain said: everyone complains about the weather, but no one does anything about it.

Local Community Fights Gas Field Development on Yamal Peninsula

18410194a Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 15 Mar 89 p 1

[Article by L. Bayandin, chairman, ispolkom, Yamalo-Nenetsk Okrug Council of People's Deputies, datelined Salekhard: "The Assault Must Be Postponed"; first paragraph is boldface SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] In the past 2 years our newspaper has often addressed the topic of the industrial development of Yamal, beneath which large natural gas reserves have been prospected. In record time a grandiose construction project began here. The assault on the Arctic peninsula was marked not only by a fast pace but also by numerous mistakes. We have already reported that the Yamalo-Nenetsk Okrug Executive Committee [okrispolkom] decided to halt the construction of surface field facilities and cut off the financing for industrial projects. The reason was serious ecological and social problems in the construction zone. This decisive step was fully approved by the okrug's native population and supported by the country's scientific community. It was especially supported because reports about the increasing pressure on local authorities from influential departments demanding that construction be restarted are causing great alarm. What's going on now at Yamal and around it?

First I recall all the complaints we made last year to the Ministry of the Gas Industry, which halted construction.

This ministry and its Tyumen subdivisions, which were the buyers, were obliged first of all to supply their builders with design documentation on the construction of surface field facilities and transportation routes. They had already coordinated actions between the Ministry of Construction of Oil and Gas Industry Enterprises' two control boards that had sent landing parties: the Yamal-transstroy Association, which was building the railroad, and Komigazprom, which had begun well drilling.

The Ministry of the Gas Industry could not meet its obligations. Only designs for individual sections were issued. Contracting organizations worked helter-skelter. Where they could have built one road, they built several. Instead of one site for a worker settlement, they cleared two or three. All this resulted in huge material losses, the true dimensions of which must still be determined. But the main thing is that nature, agriculture, and the population on the peninsula suffered harm that was totally unjustified and, to a large extent, irreversible.

To devise a well-planned strategy for developing Yamal's mineral resources, minimize its effects on the ecosystem, and totally compensate for the losses to agriculture—these were the requirements we imposed on the gas field men. They were forced to accept them, although not immediately and not without considerable complaint.

What has been done in the past half year? A new designer was found—the YuzhNII Giprogaz Institute, which was assigned to develop a comprehensive plan for building the surface facilities for the entire field. Specialists from this institute prepared a construction feasibility study without delay. The document was delivered to Salekhard for review by the ispolkom and community representatives. And what did we see? Design for gas treatment units, transportation lines.... And what about the ecology? Reindeer husbandry? The social needs of the natives? The attention they got was minimal; possible losses were clearly underestimated; problems of land and reindeer pasture reclamation were not thought out.

"Approve the feasibility study now," Gas Ministry representatives assured us, "and we'll solve these problems afterward. They require basic research, and there's no time for it. The national economy will need Yamal's gas at the beginning of the next five-year plan."

Of course, one can understand the ministry's position. But life itself presents a different kind of argument. We are now totaling the results of the active industrial development of the okrug over the last three five-year plans. Here are the tragic results. Over this period 28 rivers have been hopelessly polluted and have lost their importance for fishing. The fish catch in the okrug has dropped from 17,500 tons a year to 12,000. Six million hectares of reindeer pasture have been taken out of circulation. The use of a huge pool of all-terrain vehicles, which dug furrows in the tundra back and forth and up and down, led to a mass migration of wild animals and destroyed the nesting places of birds.

New zones unfit for habitation by the natives are constantly appearing in the tundra. The natives have been forced to leave rayons in the Medvezhiy, Urengoy, and Yamburg gas-condensate fields and in the southern part of the okrug, which has been developed by oil men.

They tell us that geologists, gas recovery men, and oil men are bringing civilization to the northerners. But here is how the consequences of this civilization look in the mirror of statistics. During the years of industrialization, the average life span of natives of the North dropped 13-14 years. Infant mortality rose, and today it exceeds the average for the RSFSR by a factor of 2.5. The number of people suffering from alcoholism has risen 60 percent. By the most modest estimates, about 20 percent of the able-bodied native population is not employed in socially useful labor.... What kind of lofty ideas can we use to justify ourselves if we open the door to this kind of "civilization" on Yamal?

The ispolkom made what seems to be the only proper decision in this situation. It approved the feasibility study, but only the part that pertained to research, planning, and prospecting. Financing was approved only for the advance construction of nature preservation and social production projects. It was stipulated that all work would again be stopped if the buyer and contractor organizations violated the strict conditions set for them. The decision also says, "Request that the USSR Gosplan, the USSR Academy of Sciences, and the USSR Ministry of the Gas Industry develop a comprehensive program to tie together the engineering, ecological, social, and economic problems of the industrial development of the Yamal Peninsula and adjacent offshore shelf. The program should pay special attention to providing social safeguards for the indigenous nationalities of the North in connection with the changes in their living and working conditions."

This is our position. We don't plan to deviate from it. We ask the support of everyone who cares about the fate of Yamal.

Start-up of Gas-Cleaning Unit at Shurtansk Gas Complex

18410176c Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 17 Mar 89 p 1

[Article by special correspondent R. Tell: "Simply Billions"]

[Text] The largest gas-cleaning unit, with a throughput of 4 billion cubic meters of fuel a year, has been started up at the Shurtansk gas complex. The development of Uzbekistan's largest field in the Karshi steppe is attaining its planned level. Pipelines have connected the Central Asian republic with the central regions of our country. Already this year, customers will receive nearly 16 billion cubic meters of natural gas cleaned by the improved technology.

Gas in Place of Coal

18410176b Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 17 Mar 89 p 1

[Article by special correspondent V. Pykh, Krasnoyarsk; first paragraph is boldface SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] The first coal gasification gas generator has been built for a Krasnoyarsk plant by the Coal Scientific-Research Institute of the Kansk-Achinsk Fuel and Energy Complex [KATEKNIUgol]. Almost at the same time the solid-fuel gasification division was converted to a laboratory.

Once our country was a leader in the area of conversion of coal to gas. As early as three decades ago, our annual production of "blue fuel" by this method amounted to billions of cubic meters. Then came the oil boom, which was followed by the gas boom. The natural stores of the cheaper energy carrier seemed to be inexhaustible. Because of the reliance on them, all other developments were canceled.

"Now we are starting from scratch," says S. Islamov, head of the solid-fuel gasification laboratory of the KATEKNIUgol. "Even the archives are gone."

The laboratory is completing the development of a design of a pilot unit capable of converting about 100 tons a day of coal to gas. But the start of its construction at one of the Kansk-Achinsk Fuel and Energy Complex [KATEK] mines is not scheduled until 1991. How many years will it take, considering that the unit, which is estimated to cost 2.5 million rubles, will occupy two whole hectares. Add to this the time for process changes and adjustments....It will take a long time before the industrial practice is developed....

On the other hand, in the United States, for example, designs are ready not only for pilot units but for plants to convert solid fuels to gas. Will we have to play catch-up again?

It is nothing new to the Siberians that, under certain conditions, gas produced from solid fuels can be competitive even with natural gas. Recently they completed technical and economic calculations for construction of a special shop at the Zykov Building Materials Plant. The new technology for gasification of local coals will not only make it possible to produce higher-quality bricks but will also prevent environmental pollution. As the calculations show, burning gas instead of coal is much more beneficial.

"This will be the first such shop in our country," remarks Islamov. "We shall start the design work still this year."

Even foreign firms are showing interest in the developments of the Siberians. They propose organizing joint ventures based on mutual benefit.

Superdeep Borehole Being Drilled

18410176a Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 17 Mar 89 p 1

[Article from TASS, Uralsk; first paragraph is boldface SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] The 8.5-kilometer-deep borehole will greatly increase the knowledge of the mineral resources of the oil- and gas-bearing Caspian Sea region. V. Sultanov's team from the geophysical expedition to the Caspian Sea Region, which was recently organized by the "Nedra" All-Union Production Geological Association, began drilling the hole yesterday.

Between 7 and 8 years is needed to achieve the planned goal. The estimated cost of drilling is about 35 million rubles. For comparison, the best teams in the country drill a 5,000-meter hole, which is commonly done, in 1 year at a cost of 1.5 to 3 million rubles. This will be the first superdeep borehole through sedimentary rocks not only in our country but also in Asia. "Huge oil, gas, and condensate reserves were found in the past at depths between 4 and 6 kilometers," says N. Bashirov, the leader of the Caspian Sea Region geophysical expedition. "The superdeep borehole will answer the question of whether the productive stratum continues or perhaps other, more important discoveries await us."

Twenty-five such boreholes will be drilled during the next decade at various points of the Caspian Sea Region.

The unusually deep drilling required fundamentally new practices. For the first time in the world, stronger drill pipes made from a titanium alloy will be used. The control of the drilling operations is automated. All data are processed by a computer, which will determine the optimum and the cheapest drilling practice.

UDC 662.276.8(571.1)

Analysis of Demulsification Methods in Preparation of Petroleum at Offshore Oil Fields

18410205B Kiev KHIMICHESKAYA
TEKHNLOGIYA in Russian No 2 Mar-Apr 89
(Manuscript received 15 Nov 88) pp 75-78

[Article by V. I. Sukhorukov, A. A. Kandaurov, and M. M. Zarifullin, Sakhalin Scientific Research and Planning Institute of Offshore Oil Production]

[Abstract] An example is used to illustrate the selection of the appropriate methods for demulsification of offshore oil to dewater it before it is pumped ashore by pipeline. Cold settling, the use of surfactants, and electrodehydration are compared. A flowchart is presented of the algorithm used to optimize demulsification method selection with an allowance for the very restricted space available on an offshore oil platform. The analysis shows that virtually all of the variables selected for use in the algorithm significantly influence

the effectiveness of the dewatering process. The globule diameter has the greatest influence on the process, and the depth of the layer of oil in the equipment has the least influence; however, all must be considered. The algorithm is found to be quite effective for selecting the dewatering method in the laboratory in the planning stage. Figures 3; References 4: Russian.

UDC 662.75

Petrologic-Genetic Characteristics Indicating Suitability of Coal for Production of Synthetic Liquid Fuel

18410209a Moscow KHIMIYA TVERDOGO TOPLIVA
in Russian No 2, Mar-Apr 89 (manuscript received 24 Jan 88) pp 3-8

[Article by D. A. Tsikarev, L. V. Shulyakovskaya, and I. V. Yeregin, Institute of Fossil Fuels]

[Abstract] Coal is among the most promising of mineral fuels and raw materials for the production of motor fuel and chemical products. A great deal of material has been accumulated on the hydrogenization of coal, which allows the major characteristics to be determined for evaluation of coal as a raw material for hydrogenization during geological prospecting. The most important parameter in the evaluation of coal for this purpose is the stage of metamorphism. Coal with a vitrinite reflection factor of 0.30-1.00 percent is suitable for hydrogenization, the optimal factor being about 0.50 percent and yielding the maximum of oil suitable for distillation. The petrographic composition is also important and should be limited to total vitrinite (huminites) materials and liptinite of at least 80 percent. The H/C ratio should be over 0.6, and the ash content should not be over 12 percent. References 16: 7 Russian, 9 Western.

UDC 541.67

Free-Radical Coals and Their Reactivity

18410209b Moscow KHIMIYA TVERDOGO TOPLIVA
in Russian No 2, Mar-Apr 89 (manuscript received 30 Apr 88) pp 26-31

[Article by A. A. Shklyayev, T. P. Miloshenko, and A. F. Lukovnikov, Institute of Chemistry and Chemical Technology, Siberian Division, USSR Academy of Sciences; Institute of Fossil Fuels]

[Abstract] The purpose of this work was to determine the nature of radical centers and changes in paramagnetism upon chemical and heat treatment of coal, and also to determine the relationship between the structural features of coal and the properties of the products obtained as a result of thermal conversion. Studies were performed on coal specimens from the Kuznets basin. It is suggested that the coal has stable supermolecular associates having natural paramagnetism that consist of microscopic solid formations measuring about 20 Å. Figures 3; References 6: 4 Russian, 2 Western.

UDC 622.02+541.183

Density of Sorbed Vapors and Gases in Anthracite Pore Structure*18410209c Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 89 (manuscript received 23 Mar 88) pp 48-51*

[Article by A. V. Astakhov, Ye. B. Vinokurova, and M. S. Gasoyan, Moscow Mining Institute]

[Abstract] A direct experimental determination is performed of the density of the following sorbates in the pores of anthracite: vapors of water and methanol and carbon dioxide and methane sorbed at room temperature at a pressure of 0.1 MPa. The pore volume filled with the sorbate was determined by the difference in volume of anthracite measured with helium at liquid nitrogen temperature before and after saturation with the sorbate. Measurements were performed on the -2+1 mm anthracite fraction. It is shown that even when elements of the pore structure are comparable in size with the molecules sorbed the density of the sorbate in them depends on the thermodynamic state of the system. At temperatures below the critical temperature and a pressure far from the gas-liquid equilibrium curve, the absorbed substances condense in the vicinity of structural elements comparable in size with the sorbate molecules. At temperatures significantly higher than the critical temperature for the gas sorbate, the density of the sorbed phase depends on pressure, so the applicability of the theory of volumetric filling for a description of sorption isotherms is questionable. References, 16: 13 Russian, 3 Western.

UDC 665.7.032.56:539.16

Use of the Labeled Atom Method to Study Coal Liquefaction Mechanism with Ionic Hydrogenization*18410209d Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 89 (manuscript received 22 Dec 87) pp 68-72*

[Article by M. F. Polubentsova, N. V. Chernetskaya, V. V. Duganova, and V. G. Lipovich, Institute of Petrochemical and Coal-Chemical Synthesis, Irkutsk University]

[Abstract] Experiments with radioactive tetraline were performed in order to determine the significance of the solvent and its conversions in the liquefaction of coal under conditions of ionic hydrogenization. The catalyst used was 87 percent orthophosphoric acid. The solvents were tetraline and tetraline-1-¹⁴C. The experiments were performed in a microautoclave with a 40 cm³ glass liner at 250 to 400 °C with contact times of 10-60 min. The coal mass was then extracted with hexane, benzene, and pyridine to extract the oil, asphaltene, and preasphaltene fractions. It is found that the oil content increases as the temperature rises from 250 to 400 °C, with a decrease in

asphaltenes. As contact time increases at 350 °C, the degree of conversion increases, but the content of oils, asphaltenes, and preasphaltenes remains the same. Figure 1; References 13: 5 Russian, 8 Western.

UDC 665.777:543

Study of Petroleum Pitch by Inverted Gas Chromatography*18410209e Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2, Mar-Apr 89 (manuscript received 24 Mar 88) pp 95-97*

[Article by L. S. Matveychuk, R. Z. Bakhtizina, F. Kh. Kudasheva, and G. A. Berg, Bashkir State University; Bashkir Scientific Research Institute of Oil Refining]

[Abstract] A study is made of the possibility of using inverted gas chromatography as a method of producing physical and chemical information on the properties of petroleum pitch. The objects of the study were petroleum pitch specimens from various batches of the same initial raw material. Experiments were performed on a column 1 m in length with a heat conductivity detector. The column was thermostatted at 298 K. The specific content of volumes of test substances modeling possible intermolecular interactions are determined. Differential molar free sorption energies are computed. A comparative evaluation of the petroleum pitches in terms of polarity is performed. References: 4 Russian.

UDC 661.666.1

Estimate of Interaction in System CO-H₂-Catalyst in Synthesis of Carbon Fiber*18410209f Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 2 Mar-Apr 89 (manuscript received 30 Mar 88) pp 106-10*

[Article by N. S. Pechuro, V. K. Frantsuzov, and M. L. Polotskaya, Moscow Institute of Precision Chemical Technology]

[Abstract] A method is suggested to analyze interactions in the CO-H₂-catalyst system that allows estimation of the effectiveness of a contact catalyst in the synthesis of carbon fiber. Experiments were performed in a quartz flow-through reactor heated by an electric furnace to raise the temperature about 20 °C/min to the assigned temperature. The experimental data were processed on a Mera-12 computer using a program based on the balance of the elements C, H, and O in the reaction. The C imbalance corresponds to the quantity of hydrogen that goes over from the gas phase to the solid phase. The hydrogen and oxygen imbalances can be used to estimate the formation of water and the occurrence of oxidation-reduction processes on the catalyst. The presence of hydrogen in the initial raw material increases the productivity and carbon utilization factor in comparison to synthesis of carbon fiber from CO. On an iron ore catalyst, disproportionation of carbon monoxide should be performed in the presence of hydrogen at 480-510 °C

with gas feed rates of 2,700-3,200 hr⁻¹. Figures 2; references 16: 7 Russian, 9 Western.

UDC 674.528:11.033

Influence of Temperature Conditions of Mixing and Pressing on Properties of Artificial Graphite

18410209g Moscow *KHIMIYA TVERDOGO TOPLIVA*
in Russian No 2, Mar-Apr 89 (manuscript received
9 Oct 87) pp 111-13

[Article by V. N. Fomina, L. R. Gizatullina, L. M. Goldshteyn, and A. K. Sannikov, State Scientific Research and Planning and Design Institute of the Electrode Industry]

[Abstract] A study is made of the influence of temperature conditions of mixing and pressing on the quality of formed graphitized electrodes by using specimens manufactured by extrusion under conditions as close as possible to the production conditions used in the manufacture of large electrodes. It is found that decreasing the temperature facilitates the formation of a compact carbon-graphite material with a low resistivity and low coefficient of thermal expansion and a superior mechanical strength and superior modulus of elasticity. Material manufactured at the lower temperature has a 30 percent lower resistivity, 2-2.5-fold higher flexural strength and dynamic modulus of elasticity, a 17 percent higher tensile strength, a 21.7-23.2 percent lower porosity, and a $0.4 \cdot 10^{-6}$ deg⁻¹ lower coefficient of thermal expansion than does graphite produced by the usual method. Figures 2; references 5: 3 Russian, 2 Western.

Plastics Plant Seeks More Freedom on Foreign Market

18410194b Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 28 Mar 89 p 3

[Article by F. Nazzyrov, datelined Shevchenko, Kazakh SSR: "Time to Earn Hard Currency"; first paragraph is boldface SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] The Shevchenko Plastics Plant is the largest chemical industry enterprise of its kind not just in this country but in all of Europe. It was developed under a direct contract by the French company Litvin, which transferred completed technical documentation, supplied equipment, and took part in the construction, installation, and startup work at the styrene and polystyrene plants.

The enterprise had an advantage from the very beginning—it worked for the foreign market. Under the contract signed by Litvin, the plant was obligated to supply its polystyrene in return for services rendered—and only high-quality polystyrene that matched the world's standards! These circumstances kept the plant workers on their toes. The strict laws of the world market mercilessly impose special responsibility for product quality and for compliance with contractual discipline.

Eight years ago, after producing the first lots of ethylene, ethylbenzene, industrial styrene, and general-purpose, heat-resistant, and foamed polystyrenes, the plant immediately promoted itself rather impressively. The Shevchenko workers became the first and, at that time, only exporters of domestic polystyrene. Four years ago it was the first in the USSR to produce a fundamentally new construction polymer—polysulfone—in a pilot plant. The product is rare and expensive.

I had not seen the plant director V. Peredereyev so animated and open for a long time. I say this because I have known him for many years; I've seen him buried in paper, sometimes in a bad mood, pulling the usual bureaucratic strings. Now at the plant he behaves in a fundamentally different way. He rarely says "I" in conversation and refers more to the opinion of the labor collective and its council. But at the same time Peredereyev is one of those businessmen about whom one says, "He knows his own mind." This is why I was somewhat surprised to hear him say, "It's easier to breathe now. New horizons are appearing..."

Where are these "new horizons" if the director bitterly complains that raw material is a problem, that styrene production is operating at only 92 percent of capacity, and the ethylene and polystyrene lines are running at even less?

"It's not just a matter of the underutilization of equipment because raw material supply is unreliable and unstable," Peredereyev explained. "The fact is that we have to act immediately to update and modernize polystyrene and styrene equipment, which is severely worn.

Domestic machinebuilding is incapable of giving us what we need. The only solution is to actively enter the international market, find suitable partners, expand barter operations, and finally, earn more hard currency."

How does the plant intend to do this? Primarily by simultaneously increasing capacities, concentrating resources and efforts on modernizing production, updating and rebuilding equipment, and introducing new process flows and technologies. The solution to these problems depends greatly on the principles by which the plant begins to trade with foreign companies and how efficiently it can cooperate with them.

Representatives of several well-known Finnish companies are frequent visitors to Shevchenko.

What caused this extensive interest in the plant? There is one answer: its products are highly competitive on the foreign market, and there is a general and acute shortage of general-purpose styrene and heat-resistant polystyrene, which are widely used in the most diverse branches of industry.

"But it's not just a matter of the prospects for plastics," explained Peredereyev. "This interest is directly related to the high prices set for our product on the foreign market. For example, the cost of a ton of polystyrene on the world market doesn't drop below \$1,200. The product is selling like hot cakes. We've conquered the market with quality, the best advertisement for any commodity."

For many years the people at Shevchenko have supplied their products to various countries, including France, England, Japan, and the FRG, and had no economic benefit from it. All profits remained at the disposal of the USSR Council of Ministers and were used at its discretion. Now for the first time the plant has gained direct access to the hard currency it has earned.

On what does the plant intend to spend its hard currency?

Almost 2 million will be needed to buy spare parts for chemical equipment. Another portion will go to acquiring the plant's own telegraph-telephone exchange and building materials for a kindergarten. In addition, it has to contribute to the city's social development. With the approval of the labor collective council, diagnostic equipment for the city's medical facilities will be purchased. Here is the plant's recent acquisition: At the Interplastik-88 Show in Moscow, it bought a powerful crushing line that will make it possible to recycle polystyrene wastes, which do not lend themselves to secondary processing now.

There are many things the director would like to buy for hard currency. With delight he showed me a brochure from the West German company Liebherr for a self-powered rubber-wheeled 300-ton lift crane, that is much needed by the plant. Only the price stands in the way—900,000 foreign currency rubles!

Peredereyev's dream is to be exempted—even for a short time—from supplying the domestic market. The argument? Many domestic processing enterprises are converting the scarce raw material produced by the plant, which is being fought for tooth and nail on the foreign market, into mass consumer goods in the worst sense of these words—goods for which there is absolutely no demand among the population.

"Let it be just a partial exemption," the director agreed to compromise. "I received samples of products from the Japanese company Iskra. They are offering to buy world-class molds. Cheap! We are still far away from such goods. We would earn millions on these molds, but we'll saturate the republic with goods."

"Western partners have not always shown an interest solely in hard currency. For example, the powerful American company McDermott has proposed automating plant production. It guarantees that capacities will increase by one-fourth without any capital expenditures through modernization and computerization alone. We've agreed. Calculations have shown that McDermott's services will be cheaper than if we would do it ourselves. And in exchange for their services the Americans are asking not for hard currency, but for raw material. Take the West German company Linde. It is proposing to modernize our ethylene production under the same conditions."

The director admits that he doesn't like to buy for hard currency. To sell, of course. It is much preferable, believes Peredereyev, to trade on the basis of barter operations or compensation and to keep the hard currency in the Foreign Trade Bank.

Butifos Converted to Harmless Resins

18410226b Tashkent PRAVDA VOSTOKA in Russian
4 Apr 89, p 2

[Article under the "Search and Solution" rubric by G. Koval, correspondent of the Uzbek Telegraph Agency: "Detoxified Poison"; first paragraph is PRAVDA VOSTOKA introduction]

[Text] Butifos—a highly toxic defoliant for the cotton plant—can be used on behalf of the economy, as it turns out, without danger to human health or the environment. Scientists at the Institute of Chemistry of the Uzbek SSR Academy of Sciences have developed a method of processing this poisonous substance into harmless polymers with ion-exchange properties. These can be used to extract precious metals and other elements from industrial and municipal sewerage and used also in hydrometallurgy.

For 2 years now, thousands of tons of butifos have been lying around, an utterly useless and dangerous burden. The problem is what to do with the substance, which has been banned for use by government decision. Western firms have offered their services—for enormous sums of

foreign currency—and have been devising different burial schemes. But all of these were too costly and unappealing.

"The solution to the problem, as often happens in science, may turn up by accident," says G. Klibley, the head of a team of inventors and director of the institute's general chemical technology department. "We had been working with ion-exchange resins for a long time. And when the task of detoxifying butifos came along, we wondered whether the "emprisoned" poison could be decomposed into resins. In theory, it was possible. For a practical verification, it was necessary to find at least a small amount of the defoliant. This proved no easy matter. Finally, one bottle was found in the warehouse of the institute itself. To avoid exposing our colleagues to risk, we worked over the weekend. And on Monday, the butifos was already detoxified."

Just as quickly, an agreement was reached with the Navoiyazot Association to create an industrial unit for conversion of the liquid poison into solid components. Volgograd, where around a thousand tons of butifos is being kept in tanks, immediately responded and consented to a collaboration.

The task now confronting the scientists and practitioners is to carefully study the characteristics of the products of the butifos conversion and bring the laboratory experience to the production line.

UDC 677.494.745.32.578.086

Microscopic Studies of Modified Polyacrylonitrile Fibers

18410219F Moscow KHIMICHESKIYE VOLOKNA in Russian No 2 Mar-Apr 89 (Manuscript received 28 Jul 88) pp 33-34

[Article by Sh. G. Abdurakhmanova, V. I. Shoshina, R. S. Ivanova, and G. N. Nikonovich]

[Abstract] This article reports on microscopic studies of modified polyacrylonitrile (PAN) fiber containing the following (in mass percents): acrylonitrile, 92; methylacrylate, 6.3; and itaconic acid, 1.7. Both optical and electron microscope studies of the PAN fibers were performed. The studies reveal that short-term (2 seconds at 25°C) treatment with ethylene diamine and CdSO_4 causes severe swelling of the surface and the less dense parts of the fiber. Treatment with a mixture of ethylene diamine and CdSO_4 produces structural heterogeneity and causes bending of the fiber when dried free. Figures 3; References 3; Russian.

UDC 541.64:539.3

High-Modulus Polyethylene Obtained by Stretching Preliminarily Swollen Polymer Films

18410220A Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 31 No 4, Apr 89
(Manuscript received 10 Sep 87) pp 694-699

[Article by V. I. Selikhova, Yu. A. Zubov, Ye. A. Sinevich, and N. F. Dakeyev, Scientific Research Physical Chemistry Institute imeni L. Ya. Karpov]

[Abstract] A study is presented of the influence of short-term swelling conditions of polyethylene film and their subsequent crystallization on the deformation capability of the polymer and the structure and mechanical properties of the oriented specimens thus obtained. Studies were performed on two batches of linear polyethylene, with monolithic nonoriented films 0.1-1.0 mm thick being obtained by pressing powdered polyethylene at 1.60°C and 17 MPa and quenching in ice water. The films were treated by various solvents at 110 to 150°C, 0.5 to 30 minutes, transferred to a spinning bath at -60 to 80°C, washed in acetone, and dried in air at 20-60°C. The results of this study indicated that the high deformability of porous specimens following compression results from their lamellar structure, which contains fewer adhesions than do monolithic films obtained by the crystallization of melts. Figures 4; references 16: 9 Russian, 7 Western.

UDC 541.64:539(2+3)

Elastic Deformation of Polymer Liquid Crystals in Magnetic and Electric Fields

18410220B Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 31 No 4, Apr 89
(Manuscript received 10 Sep 87) pp 700-707

[Article by V. N. Tsvetkov, I. P. Kolomiets, A. S. Stepchenkov, S. V. Alilov, A. Yu. Bilibin, and S. S. Skorokhodov, Institute of Physics, Leningrad State University imeni A. A. Zhdanov]

[Abstract] Two substances are studied, an aromatic polyester with a diethylene glycol spacer and a low-molecular-mass analogue of its repeating "monomer" element. The elastic orientation deformations of the substances are quantitatively studied, and the results indicate that the orientation deformations are threshold effects. The dielectric anisotropy of the two substances is determined by the use of this effect and found to be negative, similar as to order of magnitude and decreasing in absolute value with increasing temperature. This indicates that the longitudinal optical axes of the molecules of both specimens are oriented perpendicular to the field, which further indicates the large-scale orientation of macromolecules in the solution of the polymer by a mechanism of local, small-scale movement of molecular chains. Figures 6 References 20: 6 Russian, 14 Western.

UDC 541.64:539.2

Physicochemical Interactions in Composites Based on Dispersed Polycarbonate

18410220C Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 31 No 4, Apr 89
(Manuscript received 14 Sep 87) pp 708-712

[Article by V. A. Dovgialo, Ye. V. Pisanova, and O. R. Yurkevich, Institute of Mechanics of Metal-Polymer Systems, Belorussian Academy of Sciences]

[Abstract] A study is made of the physical and chemical interaction in filled polycarbonate based on the change in the glass point of the polymer as a function of the nature and concentration of the filler, processing conditions, molecular mass, and purity of the polymer. Polycarbonates with the molecular masses $1.6 \cdot 10^4$ and $4.1 \cdot 10^4$ were used in the study. The results allow an evaluation of the significance of the molecular characteristics of the polymer in the formation of its surface layers near the phase interface and provide new capabilities for regulating the structure and properties of composites based on dispersed, film, and porous-fiber binders. Figure 2; references 9: 8 Russian, 1 Western.

UDC 541.64:539.3

Influence of Orientation and Annealing on Melting and Recrystallization in Polypropylene

18410220D Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 31 No 4, Apr 89
(Manuscript received 18 Sep 87) pp 730-733

[Article by V. I. Selikhova, A. O. Baranov, Yu. A. Zubov, and N. F. Bakeyev, Scientific Research Physical Chemistry Institute imeni L. Ya. Karpov; Institute of Chemical Physics, USSR Academy of Sciences]

[Abstract] The differential scanning calorimeter method is used to study the melting behavior of polypropylene films with various prehistories, i.e., films that have been stretched to various degrees at various temperatures and films that have also been annealed. The purpose of the work is to study the influence of orientation and annealing on recrystallization processes in polypropylene and to determine the true temperature and heat of melting of the specimens. It is found that recrystallization in nonoriented films occurs only at a rate of not over 6.2°C/min. The nonoriented specimen annealed at 160°C was stable and did not recrystallize during calorimetric measurements. Specimens stretched at 120 and 140°C were highly metastable in comparison to the nonoriented specimens recrystallizing even at the recrystallization rate plus 50°C/min, which makes it impossible to determine their true melting points and heats of fusion. Figures 3; references 11: 8 Russian, 3 Western.

UDC 541.64:539.3

Mechanical Durability and Breakdown Waiting Time of Polyethylenes Made With Various Catalysts

18410220E Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 31 No 4, Apr 89
(Manuscript received 22 Sep 87) pp 742-747

[Article by R. A. Mustafayev, S. A. Abasov, T. I. Guseynov, I. K. Aliyeva, and T. M. Veliyev, Azerbaijan Polytechnical Institute imeni Ch. Ildrym]

[Abstract] Results are presented from studies of the mechanical durability in a strong electric field and electrical durability with simultaneous application of mechanical stress at 163 K to commercial polyethylene, as well as polyethylene synthesized in the presence of TiC and MgAlTi with various melt flow points. The electric field is found to decrease the mechanical durability of the specimens, whereas mechanical loading at cryogenic temperatures changes the conditions of development of microscopic defects and the development of injection processes, which is manifested as a decrease in breakdown waiting time. The results of this study can be used to predict the service life of polymer insulating materials exposed to mechanical, temperature, and electric stresses. Figures 6; references 7: 5 Russian, 2 Western.

UDC 541.64:539.3

Connection Between Size of Crystals and Yield Point of Polyolefins and Composites Based on Them

18410220F Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 31 No 4, Apr 89
(Manuscript received 30 Sep 87) pp 776-779

[Article by V. A. Bershteyn, A. G. Sirota, L. M. Yegorova, and V. M. Yegorov, Institute of Physics and Technology imeni A. F. Ioffe, USSR Academy of Sciences; Okhtinsk Scientific Production Association Plastopolimer]

[Abstract] An experimental study is presented of the relationship between the yield point at temperatures above the glass point and a thickness of lamellar crystals l_k in polyolefins, including specimens bombarded with fast electrons and subsequently heat-aged at 448 K. Experiments were performed on low- and high-density polyethylene, copolymers of ethylene containing 10 percent vinyl acetate or 1 percent hexene, their mixtures, and various composites containing a thermal stabilizer, as well as antipyrenes and other additives or finely dispersed aluminum hydroxide filler. Bombardment was performed in air to doses of 25, 100, and 225 Mrad at 20°C, a dose rate of 8 Mrad/min, and thermal aging for 300 and 600 hours. The yield point was found to vary linearly with lamellar crystal thickness for all specimens, thus indicating the need to preserve the high

crystal thickness of polymers to ensure adequate resistance to inelastic deformation. Figures 3; references 17: 13 Russian, 4 Western.

UDC 541(127+64):532.72

Determination of Sorption-Diffusion Properties of Synthetic Fibers by Macroscopic Kinetic Method

18410220G Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 31 No 4, Apr 89
(Manuscript received 15 Oct 87) pp 870-875

[Article by A. N. Yermolin, V. I. Gerko, V. A. Tarasenko, and A. N. Ponomarev, Institute of Energy Problems of Chemical Physics, Ukrainian Academy of Sciences]

[Abstract] The purpose of this work was to develop a mobile experimental method to investigate the sorption-diffusion characteristics of fiber materials and determine the sorption and diffusion parameters of acrylonitrile in PA fiber. The method used allowed the measurement of sorption-diffusion characteristics by three methods that differed with respect to their boundary and initial conditions. The method can determine the sorption-diffusion parameters and their variation with temperature with satisfactory accuracy and speed for AN-Capron fiber and can be used to optimize conditions for modifying textile materials by gas-phase radiation grafting. Figures 5; references 10: Russian.

UDC 541(127+64):542.92

Method of Kinetic Monitoring of Polymerization by Toms Effect

18410220H Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 31 No 4, Apr 89
(Manuscript received 23 Jun 88) pp 875-877

[Article by V. N. Manzhay, G. L. Savinov, G. V. Nesyn, and A. Ya. Malkin, Tomsk Polytechnical Institute imeni S. M. Kirova; Plastmassy Scientific Production Association]

[Abstract] The authors attempt to experimentally prove the possibility and desirability of using the effect of decreased hydrodynamic resistance, which is estimated on the basis of the increase in the flow of polymer solution as compared with the volumetric flow of solvent as a method of monitoring polymerization kinetics in the initial stages of polymerization. The method utilizes the capillary Toms effect, which is manifested as follows: when a polymer additive is present, the flow rate of the liquid increases for a given pressure. Limitations of the method include the fact that the critical degree of polymerization, beginning with which the polymer works as an agent to decrease flow resistance, is rather high, on the order of $0.5 \cdot 10^4$, which means that the method is only suitable for manufacturing high-molecular-mass products. In spite of this limitation, the rheometric method suggested is quite promising since the Toms effect occurs at very low polymer concentrations, which improves the

sensitivity threshold in comparison to spectral and viscosimetric monitoring methods by at least an order of magnitude. Figures 3; references 2: 1 Russian, 1 Western.

UDC 541.64:539.3

Use of Mathematical Statistics To Study Long-Term Polymer Strength

184102201 Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 31 No 4, Apr 89 (Manuscript received 28 Jun 88) pp 877-882

[Article by A. A. Valishin and E. M. Kartashov, Moscow Institute of Precision Chemical Technology imeni M. V. Lomonosov]

[Abstract] Experimental strength studies do not make sufficient use of statistical methods such as multivariate regression analysis. This article discusses a modern approach to the determination of equations and, by using the example of the temperature-time variation of strength, demonstrates their use in action. The presentation is oriented toward the use of computer equipment and avoids the construction of graphs and extrapolations and the resultant loss of accuracy. A full statistical analysis of the models of Zhurkov and Bartenev is presented, and the minimum volume of experimental data required for unambiguous determination of durability parameters is established. References 7: Russian.

UDC 541.18.045

Preparation and Properties of Starch-filled Cellulose Acetate Membranes for Reverse Osmosis

18410173f Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 55 No 3, Mar 89 (manuscript received 9 Nov 87) pp 326-329

[Article by M. T. Bryk and N. N. Bagley, Institute of Colloid and Water Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] A number of parameters were investigated to assess the use of starch fillers for the modification of cellulose acetate membranes for reverse osmosis. The introduction of a small quantity of the filler in the formation stage had a profound effect on the membrane's performance, affecting the flux and clogging rates and, therefore, efficiency. For example, the retentivity for membranes with a finely dispersed filler (0.3-15 μm) did not exceed 33 percent at 809 $\text{L}/\text{m}^2\cdot\text{d}$, while with large-grain (15-40 μm) filler the corresponding parameters reached 88.8 percent and an efficiency of 1,077 $\text{L}/\text{m}^2\cdot\text{d}$. Thus, through the use of appropriate fillers the films can be strengthened and their performance characteristics modified to meet various requirements. Figures 2; tables 1; references 9: 6 Russian, 3 Western.

UDC 532.74:532.614:628.17

Structure of Liquid Water Surface Layers

18410180a Kiev *KHIMIYA I TEKHOLOGIYA VODY*
in Russian Vol 11 No 3, Mar 89 (manuscript received
14 Jun 88) pp 226-228

[Article by Yu. I. Tarasevich, Institute of Colloidal Chemistry and Hydrochemistry imeni A. V. Dumanskiy, Ukrainian Academy of Sciences, Kiev]

[Abstract] Reducing the evaporation of water from a surface requires knowing the features of the structure of the surface layers of water. The energy of water molecules in surface associations is greater than molecules within the body of the water itself, a result of either fewer hydrogen bonds in which the surface molecules participate or a lower energy of the bonds, or both. In the surface layers, quasi-two-dimensional domains are formed whose molecules participate in a fewer hydrogen bonds. The entropy of monomer surface-layer water molecules can be determined if they are assumed to be self-adsorbed on the surface of the water. The monomer molecules may be considered as molecules of a two-dimensional gas which retains rotational degrees of freedom, two translational degrees of freedom and one oscillating degree of freedom perpendicular to the surface in the transition to the surface. Computations indicate that the most efficient means for decreasing the evaporation of water is to introduce a nontoxic low-solubility surface-active agent to the surface, such as products of the attachment of ethylene oxide to higher alcohols. A monoester of octadecyl alcohol and ethylene glycol has been found most effective. References 22: 17 Russian, 5 Western.

UDC 661.471.7+66.067.38

Extraction of Iodine from Aqueous Solutions by Ultrafiltration in Combination with Complex Formation

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in Russian Vol 11 No 3, Mar 89 (manuscript received
28 Jul 88) pp 229-230

[Article by Yu. I. Dytynskiy, Yu. N. Zhilin, G. A. Kostromin, R. G. Kocharov, Moscow Chemical-Technological Institute imeni D. I. Mendeleyev; Crimean Scientific Production Association "Yodobrom," Saki]

[Abstract] A study was performed to select conditions for extracting iodine from aqueous solutions by complex formation and ultrafiltration with the use of poly-4-vinyl-N-benzyltrimethylammonium chloride (the flocculating agent VA-2) as a polymer additive. The influence of solution composition and operating pressure on the basic characteristics of ultrafiltration of iodine-polymer complexes was studied. Experiments were performed on an ultrafiltration cell at about 0.2 MPa, pH 2, 20+/-2°C, polymer/iodine ratio 12 kg per kg, with natural water imitated by dissolving iodine and sodium chloride in

distilled water. The process was found to be mainly controlled by the composition of the solution and the peculiarities of interaction of iodine and the polymer in the solution. Figure 1; references 8: 6 Russian, 2 Western.

UDC 628.165:532.71

Properties of Dynamic Membranes of Polyacrylic Acid

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in Russian Vol 11 No 3, Mar 89 (manuscript received
15 Jul 88) pp 231-232

[Article by V. L. Dedechek, D. D. Kucheruk, M. I. Ponomarev, Institute of Colloidal Chemistry and Hydrochemistry imeni A. V. Dumanskiy, Ukrainian Academy of Sciences, Kiev]

[Abstract] A study is made of the reverse osmotic properties of a dynamic membrane of polyacrylic acid formed on a UAM-500 cellulose acetate membrane. The retention capacity of the dynamic membrane was determined with a 0.01 M solution of sodium chloride and sodium sulfate containing 0.001% polyacrylic acid, with the pH of the solution varied by the addition of a 0.1 M solution of sodium hydroxide or nitric acid. Introducing the polyacrylic acid reduced the productivity of the UAM-500 membrane, rendering it selective for ions of inorganic salts. A dynamic layer made of the polyacrylic acid formed on the surface of the ultrafiltration membrane. Performing the modification process at a pH of about 2.5, when the macromolecules are not ionized and a dense modifying layer forms, produced a highly selective dynamic layer. Raising the pH led to a denser layer of polyacrylic macromolecules, as evidenced by a membrane productivity of 800-2000 l/(m² x day). The modified layer showed maximum selectivity at pH 4-5, but its structure was still rather dense. The pH of the working solution played a substantial role in the separation of the solutions with components that cross-link polymer chains. Maximum precipitation of the polyacid was observed at pH 4. Cross-linking the polyacrylic acid leads to a substantial reduction in membrane productivity, with negligible change in selectivity. Overall, the authors found that using a polyacrylic acid as a membrane-forming additive produced a dynamic membrane with high selectivity for anions and that the presence of multiply charged cations in the region of high pH can lead to undesirable cross-linking of the acid. Figures 2; references 11: 6 Russian, 5 Western.

UDC 541.18.045

Peculiarities of Calibration of Ultrafiltration Membranes With Solutions of Nonionogenic Organic Substances

18410180d Kiev *KHIMIYA I TEKHOLOGIYA VODY*
in Russian Vol 11 No 3, Mar 89 (manuscript received
29 Apr 88) pp 232-236

[Article by Ye. A. Tsapyuk, Ye. Ye. Danilenko, V. M. Kochkodan, M. T. Bryk, Institute of Colloidal Chemistry and Hydrochemistry imeni A. V. Dumanskiy, Ukrainian Academy of Sciences, Kiev]

[Abstract] A study is presented of the calibration of ultrafiltration membranes using aqueous solutions of nonionogenic organic substances, particularly polyethylene glycol (PEG) with various molecular masses. Ultrafiltration membranes of cellulose acetate, polysulfonamide on a substrate, and nuclear membranes were used in the experiments. The substances for calibration were 0.4% aqueous solutions of glycerin, glucose, and saccharose with molecular masses of 72, 180, and 343, respectively, as well as PEG with molecular masses ranging from 400 to 40,000. The studies indicated that selecting conditions of calibration is a very difficult task and that the same conditions cannot be used for all membranes. Information closest to reality is obtained by experimentally determining retention coefficient dependences, such as pressure, under the most intense possible agitation and in the absence of effects which modify the separating properties of the membranes. Figures 3; References 14: 7 Russian, 7 Western.

UDC 541.183+628.33

Separation of Binary Mixture of Substances With Continuous Stepped- Counterflow Adsorption

18410180f Kiev *KHIMIYA I TEKHOLOGIYA VODY* in Russian Vol 11 No 3, Mar 89 (manuscript received 25 Mar 88) pp 249-250

[Article by R. M. Marutovskiy, V. I. Shandura, I. G. Roda, V. Ya. Kaganov, Institute of Colloidal Chemistry and Hydrochemistry imeni A. V. Dumansky, Ukrainian Academy of Sciences; All-Union Institute of Planning of Chemical Plant Protection Agents, Kiev]

[Abstract] A theoretical equilibrium model of continuous adsorption of a binary mixture of organic substances from aqueous solutions is developed for a two-stage system using mixer-reactors. The possibility is demonstrated of separating the components of a mixture in continuous

systems. The authors found that it is possible to separate the components of a binary mixture in the first stage of extraction in the course of adsorbent movement, that the adsorption properties of the components significantly influence the degree of their separation in the first stage in equilibrium conditions, and that kinetic factors must be considered to achieve more precise modeling of separation of mixtures in continuous process systems. Figure 1; references 9: 7 Russian, 2 Western.

UDC 541.183

Adsorption of Dissolved Substances by Suspended Active Carbon Layer in Continuous Apparatus

18410180g Kiev *KHIMIYA I TEKHOLOGIYA VODY* in Russian Vol 11 No 3, Mar 89 (manuscript received 12 May 88) pp 256-259

[Article by I. G. Roda, L. K. Ishcheykina, Institute of Colloidal Chemistry and Hydrochemistry imeni A. V. Dumansky, Ukrainian Academy of Sciences, Kiev]

[Abstract] A study is made of the process of adsorption of dissolved substances by a suspended active carbon layer in models of continuous apparatus and industrial multisection adsorbers in an attempt to substantiate the basic tenets of an idealized fluidized-bed model and determine the possibility of using the model in the design of adsorption equipment. The authors used a single-chamber adsorption unit in their experiment. They found that if the ascending fluid flow moves relatively slowly, ensuring low porosity of the fluidized bed and its expansion, the deviation of experimental data from calculated data may be as great as a factor of 2-3. It was found that at low flow speeds a significant portion of the active carbon, which has a broad fractional composition, lost its mobility in the industrial apparatus. There is a very narrow range of hydrodynamic conditions in the suspended layer within which the idealized fluidized-bed model may be used for designing industrial adsorbents. Figures 2; References 11: Russian.

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